SPECIAL HELI GLOSSARY!

September 1989

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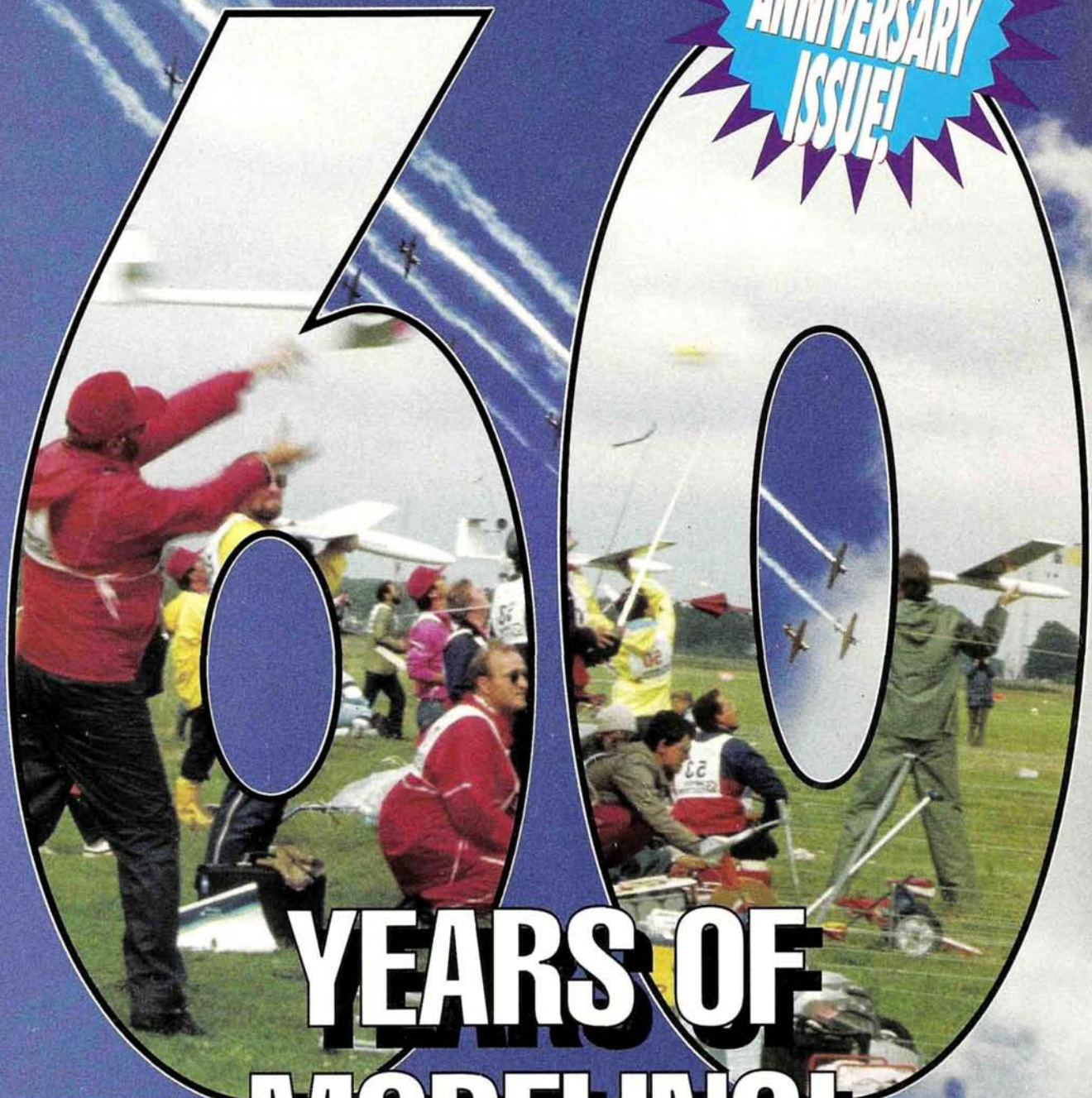

YEARS OF MODELING!

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SEPTEMBER 1989 VOLUME 117, NUMBER 9

MODEL AIRPLANE

FEATURES

CONSTRUCTION

HELICOPTER SECTION

COLUMNS

DEPARTMENTS

ON THE COVER: What better way to exemplify the 60th anniversary of Model Airplane News than to combine the two elements that have remained constant throughout our history ... modelers and airplanes. The creative wizardry of our Art Director, Alan Palermo, and his staff is evident in the subtle blending of elements and color. The Concept 30 helicopter of Nick Ziroli Jr., now wearing a new Jet Ranger conversion body from Global Hobbies, hovers approvingly above.

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Editorial

by RICH URAVITCH

39,000 FEET AND WESTBOUND ...

TAKING AN OCCASIONAL trip on any modern commercial airplane is usually about as exciting as watching chocolate melt. (The seats are less comfortable than the ones in your living room, the movie is likely to be a re-run, and *forget* the food!) This one's no exception, but it's probably just as well, because it provides "wind-down" time from what was exciting about the trip—the purpose!

I'm about an hour out of New York right now, having just spent two whirlwind days in England attending the premier British Ducted-Fan Meet. The pace was too rapid to let my body clock get screwed up, but it did provide the opportunity to meet some wonderfully hospitable people, a lot of creative modelers and to experience just a taste of some old-world charm.

A lot of the modelers I met were the same chaps (see what I learned in just two days? Insidious, isn't it?) I'd read about in the many foreign publications I receive, and guess what?—they were just like the rest of us modelers: scratch-building, designing, flying (both airborne and hangar); pretty much about the same things, too.

Modeling is a huge fraternity, and it's comforting to know that virtually anywhere you go in the world, you'll always find someone who can "speak your language." We'll have a full feature story on the adventure in a future *MAN;* it was *one* of the best "48-hour" passes I can remember!

Once you get past this page in the book (since we hope the cover grabbed your interest enough to get you this far), you'll find that we've tried to create a feel for how our hobby/sport has progressed and matured. We've also tried to convey just how *Model Airplane News* fit into all this growth. I've just had a brief conversation with the publisher, who filled in some of the blanks in our history, and I came away with a great feeling. Why? Because I'm part of a publication that's been around for *60* years! (Most publication new-starts last *less* than *two* years!) All of us at Air Age are immensely proud of that record, and we thank you for making it so. Here's to the next 60.... ■

Rich

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Airwaves

WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves" *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

Aluminum Overcast in 1/10 Scale

My hitch in the Air Force put me at Kindley AFB in Bermuda from June '61 to June '63. Being a medical corpsman, I had to take the "cracker box" (ambulance) to the flight line to pick up and deliver patients who were going out or coming in. I vividly remember the many aircraft that were based there. Kindley Field was a TAC and MATS base. Other planes like the F-104 and F-106 were refueled by Kindley-based refuelers. There were C-54s, C-47s and the huge C-124 Cargomaster, built by Douglas, I believe. This plane looked like it would never get off the ground. It would moan, groan and squeak and use up every foot of the strip before lifting off.

I'm a new AMA member with a model-airplane club based in Akron, OH. Although I've built two trainers, my interest is in giant scale. Do you know if plans are available for the C-124 Cargomaster? If so, where can I obtain them? This plane would make an awesome 1/12- or 1/10-scale project.

J. ZUCCHERO
Kent, OH

Mr. Zucchero, AWESOME?? Let's put this thing in perspective, shall we? The project you're considering will produce, in 1/10 scale, a Globemaster that spans 17½ feet and is 13 feet long. Calling that awesome is like calling Raquel Welch attractive! I don't know of any plans available, but if you'll send us your entire address, maybe some of our readers can help. Please keep us advised, and good luck!

RAU

Gas Plane Relief?

I ventured into the model craze when I was 10 years old. Now, four years later, I'm still absolutely nuts about model planes. I am currently building a small balsa plane with a microscopic wingspan of 15 inches. I am curious to know whether or not it's possible to motorize a plane of this size for free flight. I've already been to the nearest hobby shop to research small engines, but they're simply monstrous compared to my plane, even the smallest one! So I was wondering if anyone at *MAN* knew anything about those engines that run on carbon dioxide, and whether they still make them or not. Your help would be greatly appreciated! (And incidentally, thanks for a terrific and extremely helpful model magazine!)

GUS WOJCIK
Berwyn, PA

Gus, CO_2 engines are available, but they're not that easy to find. One that comes to mind is the Telco unit, which is manufactured in England and was imported by Polk's. You might check with them for availability. An alternative might be the CO_2 conversions available from Davis Diesel Development. These are designed for some of the smaller Cox engines, but they might still be a bit too much for your diminutive design.

RAU

Valkyrie Visions

After 25 years away from the hobby, the urge to build and fly just cannot be resisted any longer. Consequently, five R/C aeroplanes are currently under construction. In between came college, a marriage, a job, campers and sailboats. But, as I now discover, first loves die hard and it's back to modeling. What I desperately need right now, is a little help in reconstructing the past. Both my father and I remember building a solid balsa (3/32 sheeting if my memory is right), profile

(Continued on page 10)

Airwaves

(Continued from page 8)

fuselage, canard style, delta wing, .049 pusher model for the ill-fated B70 bomber. We built the model from plans published in *MAN*, we believe some 25 to 28 years ago. The plane, a free-flight, flew like a dream and I would like to rebuild it as an R/C model if I could only find those original plans. Is there anybody out there who can help us? Many regards to your fine magazine.

TONY LOCKYER
325 Grangewood Dr.
Waterloo, Ontario
N2K 2E4 Canada

OK, modelers, we don't have the plans, but I do remember a kit being produced by Competition Models. They frequently advertised the model in MAN. *Can anyone out there help Tony?*

RAU

Twice as Smooth

I'm sending you photographs of my latest twin: the Smoothie Too. It's a "kit-bashed" Balsa USA Smoothie. This is my eighth twin project over the past 10 years. Although I've scratch-built six of my previous twins, I've always been on the lookout for inexpensive kits that can be easily modified into good-flying, fully aerobatic twins—thus the selection of the symmetrical airfoil Smoothie. The modifications to the Smoothie kit include: changing the landing gear to a tricycle type and increasing the wingspan to 57 inches by adding one additional rib bay to each wing. It's powered by two O.S. .20 FPs; each of which is mounted with 5 degrees out-thrust. Previous to powering this twin, the engines had logged 60 flights on my Twin Star 15 (which appeared as a construction article in the January '89 issue of *RCM*). The Smoothie Too has currently logged 23 flights, and it has even flown in a fun fly or two. The Smoothie Too is fully aerobatic, but it's a bit heavier than I like: The plane weighs a bit over 5 pounds for a wing loading of about 20 ounces/square foot. Two more of these Smoothie Too's are under construction, with additional modifications: increasing the wingspan to 62 inches by adding two rib bays to each wing; lightening the fuselage to reduce weight; and adding engine cowls to make the plane prettier. Good-flying twins are always popular at the flying field, and the Smoothie Too furthers the twin mystique. If there's sufficient interest, I may be willing to do a "kit bashing" article on this project.

MIKE SHERROD
Houston, TX

How about it, twin kit bashers? Is there enough interest? It's got my vote!

RAU

Prescription from the "Doc"

I want to compliment you on your excellent June '89 biplane issue. It's most interesting reading, particularly for us who are interested and, frankly, fascinated by old airplanes. Let me also thank you for the really superb coverage of the 4-120 bipe by Art Schroeder. If you'd like, the following might be of interest to anyone searching for an alternative powerplant to the relatively expensive 4-stroke engines: "Numerous 4-120 bipes and monoplanes are being successfully flown using Zenoah G-23 powerplants. The model balances with little ballast, the fire wall needs no modification, and only a slight bit of nose-block trimming is needed when a Bennett muffler is used. The G-23 seems happy on a 16x8 Master Airscrew and a blend of unleaded gasoline and Lawn Boy motor oil mixed like you'd use to mow the lawn. Pulling power is equivalent to a hot 120 4-stroke. Sev-

eral 120 bipes are also flying with Quadra 35s and Zenoah G-38s. However, these require some additional 1/4x1/4-inch strip added between the turtle deck formers and at the fuselage bottom. In both instances, the tail bracing wires are critical and should be solidly installed. Additionally, wire interplane struts are advisable when using the larger chainsaw-type power plants.

DEE B. MATHEWS
Wichita, KN

There you have it, folks, it doesn't come from any higher authority than that! For those of you who may not know it, "Doc" Mathews is the designer of the tremendously popular series of airplanes now kitted by Ace, including the 4-120 bipe. From all of us who have built, flown and thoroughly enjoyed the designs—thanks Doc! RAU

Bulletin from O.S.

We are pleased to announce that the warranty period on O.S. engines has been extended to two full years. This coverage warrants O.S. engines to be free from defects in parts and workmanship under normal use for two years from the date of sale to the original purchaser. The new warranty period supercedes the current period of 90 days. New warranty cards will be included with O.S. engines beginning in Spring '89. In the meantime, Hobby Services, the authorized O.S. Service and Warranty center, will honor all legitimate warranty claims to the original purchaser from any O.S. engine purchased within the last two years. All claims need to be accompanied by a proof-of-purchase date and a complete written explanation detailing the problem. Engines should be sent via UPS or insured Parcel Post to: Hobby Services, 1610 Interstate Dr., Champaign, IL 61021. The O.S. Two-Year Warranty heralds a new era in the service and support of the finest line of model engines available. Now, the modeler's first choice for quality and performance is backed by an improved warranty policy and a service philosophy that aspires to the highest standards. Only O.S. could bring the finest product together with the security of extended warranty protection, giving every modeler the confidence of quality. O.S. Engines are distributed to leading retailers nationwide by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Bored? Are You Kidding?

Thank you for *MAN*. Your magazine and its content are class. I've been a modeler since I was a kid...and I'm now 47. I remember *MAN* as a kid. Upon re-entry to R/C five years ago, I picked it up again. Now a subscriber, I find many excellent ingredients in *MAN*. Just a few are: quality photo work; excellent construction articles; superb writing and editorial work; focus on aircraft; the right mix of advertising and features. I could go on ... but you'd be bored. And may God bless Budd Davisson and his articles. When the day comes that you must replace him, you'll have a severe challenge! Please keep up the great work!

I'm now a 1/4-scale nut ... but will continue with *MAN*. Your recent plans for the giants are also appreciated.

DAVE PRINTZ
Burr Ridge, IL

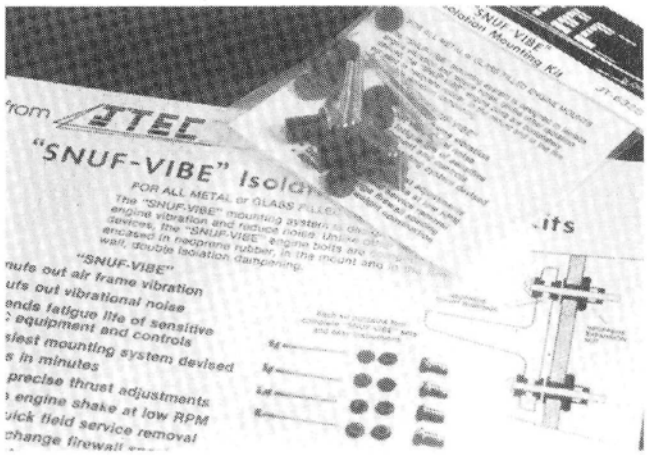
Dear Dave, Go on, go on; tell us more, please drive our whole Air Age crew into new depths of boredom, we love it. Severe challenge? Are you kidding? We're talking major upheaval here! We do, however, have all of Tactical Air Command and half of the EAA membership at large on call to fill in for Budd if he ever goes on vacation. Thanks for the kind words, and we hope you enjoyed Budd's presentation on a "giant model" Mustang, the Loeble 5151, in the August issue.

RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," **Model Airplane News**, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and length.

Basics of Radio

by RANDY RANDOLPH



J'Tec's contribution to vibration reduction in our airplanes.

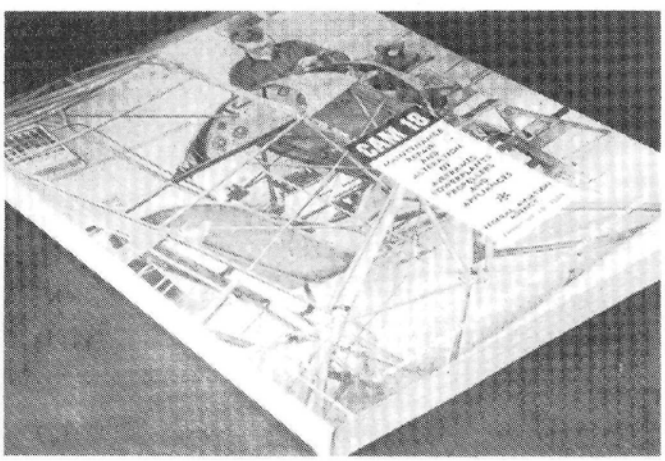
VIBRATION HAS ALWAYS been a problem with anything powered by an internal-combustion engine. Other than crashing, it's the main reason for the failure of model structures and the limits on useful equipment life. If radios and battery packs aren't protected by layers of foam or other vibration-absorbing material, they simply don't function.

Until now, mounting systems for model engines that provided vibration dampening were adapted from products that were designed for other applications. A fair amount of money and a large dose of ingenuity were required to install these mountings. Their use has been largely limited to those who fly large, rough-running giants and the better pattern fliers who practice a number of hours each day. They've found that vibration-reducing engine mounting greatly prolongs engine and equipment life.

Snuf-Vibe, a new product from J'Tec*, is an easy-to-install vibration-reduction system that's both effective and inexpensive. Two sizes are available: one for average sport engines and one for the larger engines that fit in the bigger birds. Using this product doesn't mean that vibration protection of vital radio parts can be neglected, but it does enhance the effectiveness of these protection systems. There's no such thing as a 100-percent-reliable radio system, but each step, like this new product, brings that unreachable condition just that much closer, and it might be the difference between an airplane and an unpleasant memory at the end of a flying session!

Electric-powered airplanes don't seem to suffer from vibration problems as much as gas-powered ships do. Some electric kits even recommend receiver- and battery-mounting systems that offer practically no protection from vibration. Although this type of mounting is usually sufficient, the addition of some foam around the receiver and flight battery can do no harm.

With their smaller receiving "window," and the two crystals that determine the position of that window in the radio spectrum, the new dual-conversion, narrow-band receivers are even more vulnerable to vibration than the older, wide-band equipment. Temperature changes can also cause changes in the operating frequency (or receiving window), and, since most of the vibration-dampening material used around receivers also acts as insulation from heat and cold, its value is increased even more! Transmitters can suffer the same fate, so they shouldn't be subjected to temperature extremes.



The home-built aircraft builders' bible is handy for modelers, too!

While on the subject of vibration, it might be good to consider its close relative: flutter. Flutter can be described as an airflow-induced oscillation of one or more flight surfaces. It occurs more often in ailerons and elevators, but can happen to any flight surface.

While vibration is a slow-acting condition that gradually deteriorates aircraft structures, flutter can be explosive in effect! Once it's initiated in a surface, quite often that surface is destroyed in a matter of seconds. The loss of a control surface in flight is almost always catastrophic, and flutter only occurs in flight.

The principal cause of flutter is slop or play in the pushrod, control-horn or servo-arm areas of the control surface. The holes in control horns must be a good, solid fit for the clevis from the servo. Likewise, the pushrod clevis or connector should fit the servo arm the same way. Hinge lines must be straight with no binding and no play. A surface that distorts when it's actuated is an indication of a bad hinge line and it should be corrected before flight is attempted.

Flutter is a function of air speed, and when it's detected in flight (and the sound is unmistakable), power and speed must be reduced *immediately* to minimize

Control

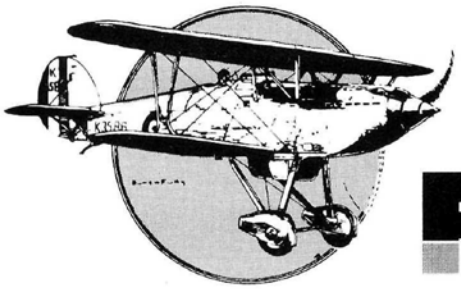
damage. The surface causing the flutter should be determined and the cause corrected before flying is resumed. Like most things, it's better to do it right the first time: There may not be a second chance!

At one time, the FAA published a book called *CAM 18* (Civil Aeronautics Manual Number 18). Among other things, it contained a collection of the Civil Air Regulations pertaining to the repair and alteration of airframes and propellers. *CAM 18* went out of print in the late '50s, but reprints are still be available from the Experimental Aircraft Association*. Between the covers of this old tome, there's much information that should interest modelers about the construction and repair of wooden airframes. Anyone who contemplates building a giant-scale model should buy a copy.

In retrospect, it's difficult to tell just where aircraft construction techniques came from—model or full-scale! Early designers acquired their knowledge by building models, then translated this knowledge into "flying machines." When flying machines started to capture the public imagination, it became a popular pastime to construct models of these flying machines! Over the years, almost every new full-scale design started as a model and the model/full-scale/model cycle repeats itself, over and over and over!

Now, which came first, the chicken or the egg?

**Here are the addresses of the companies mentioned in this article:*
***J'Tec**, 164 School St., Daly City, CA 94014.*
***Experimental Aircraft Association,** P.O. Box 3086, Oshkosh, WI 54903-3086.* ■



Fifty Years Ago

by LYNNE SEWELL

TWO DAYS BEFORE the U.S. declared its neutrality, the first American victims of WW II had been declared missing. Why were these innocent citizens of a neutral country among the first to die? They were passengers on a British, outward-bound passenger liner (the Athenia) on September 3, 1939.

On September 1, Hitler's armies invaded Poland, and, honoring their commitment to defend Poland, Britain and France had declared war against Germany on the day the hapless Athenia left its comparatively safe mooring. The war at sea had begun immediately war was declared, and 112 people (including 28 U.S. citizens) died when the Athenia was torpedoed by German U-boats.

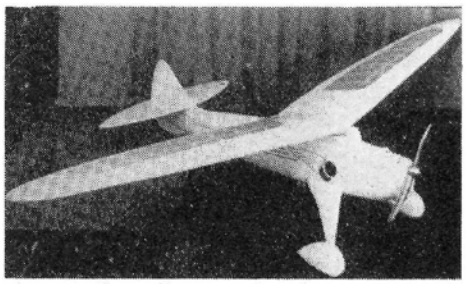
Naturally, the situation in Europe didn't go unnoticed by the editors and columnists at *MAN*. The September '39 cover showed the Consolidated Model 31 flying boat, which represented "a complete abandonment of conventionality" and had amazed everyone when it had been introduced a few months earlier.

Described as an "astounding flying hotel," its perfect wing curve would fly at minimum drag, and the hull would take off and land on water. The first production model would have seats for 52 passengers and "luxurious sleeping accommodations" for 28 people on trans-oceanic flights (think our editor would have appreciated such a craft for his June trip to the British Ducted-Fan Fly-In!). Or would the Consolidated 31 be a long-range, fast-flying naval torpedo plane and patrol-bomber? The fuselage could just as easily hold heavy-duty machine guns, bombs, or torpedoes; and when the September '39 issue was going to press, who could guess which?

Columnist Robert McLarren was convinced that the plane's versatility (it could touch down on land as well as water), cruising range of 10,000 miles, and top speed of over 275mph assured it of a bright future—"for passengers or aerial terror."

The '39 Nats

Held at Wayne County Airport in Detroit, MI, the '39 Nats attracted 1,100 contestants for fours days' flying—"a dizzy whirl of events"!—and was amply reported in *MAN*. A photo of the contestants listening to a pep talk shows us that staying up until the wee hours to repair and ready for the next day's combat was taking a heavy toll: One modeler is sleeping soundly as he leans heavily on his neighbor!



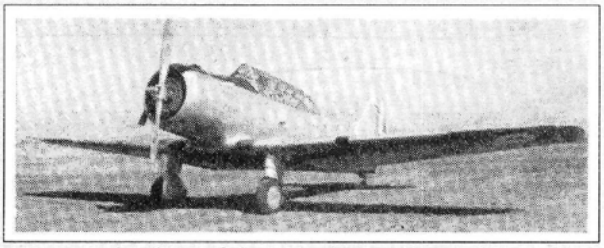
A typical, well-proportioned, gas-powered model plane.

As usual, model dealers presented their wares and " ... the shining colors of the *Model Airplane News* display lent character to the scene." The most outstanding manufacturer's exhibit was a new, opposed, twin gas engine that developed up to ½hp, but even more exciting was Walter and Bill Good's display with the first R/C-powered model ever flown at a national contest. You can see a photo of these pioneers in this issue's "Aeromodeling Through the Years" by Hal deBolt. Walter later went on to scoop up the top prize of $100 in the R/C Power Model event. Joe Raspante also displayed his R/C virtuosity with a beautiful 10-foot red cabin model, but his flight was interrupted by interference from another's transmitter. The motor shut off halfway through a figure-8, but there was no damage.

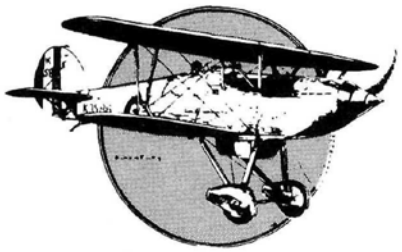
Unfortunately, government and army regulations forbade the use of the paved runways, so models had to be hand-launched, because the fairly long grass

(Continued on page 16)

The completed Fairchild 82. The large wingspan, long motor and ample propeller ensured long flights.



France ordered 230 of these North American trainers with slots and flaps.



FIFTY YEARS AGO

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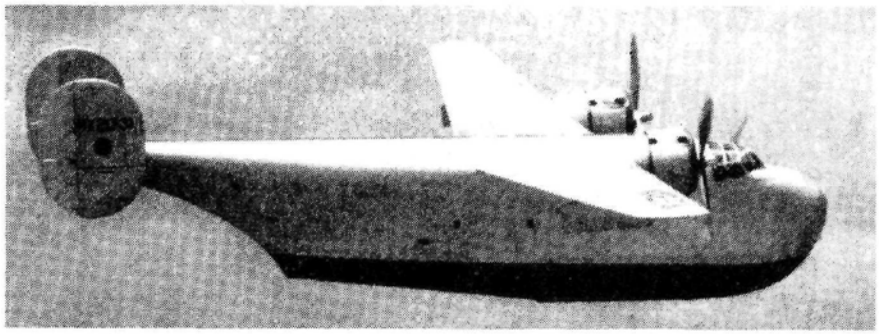


The Consolidated flying boat at 275mph. Sleep in comfort as you travel!

and dead air made ROGs impossible. Since this didn't meet NAA rules, none of the flights was eligible for recognition as a record, even though some lasted up to 17.51 minutes. The event was such a success that participants apparently "staggered home with glazed eyes"—anyone ever done that?!

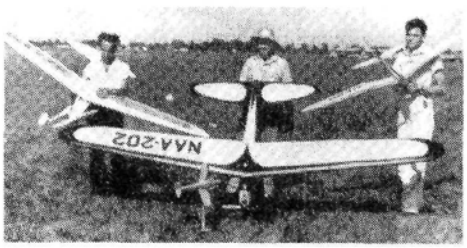
Help for Readers

"Pappy" deBolt's aforementioned article emphasizes the lack of available help in the early years of modeling and tells us how valuable *MAN's* articles were to modelers at that time. He could have had the September issue in mind, because it was particularly well-stocked with the sort of information for which modelers were then desperate.

Our first Editor, Charles Hampson Grant, contributed "Fundamentals of Model Plane Design," which was obviously very appropriate. Grant said that even though a plane might have all the "required structural factors," it might still be incapable of flight (don't we know it!), and he told readers about the need to take "invisible" factors into account: CG, surface angles, weight distribution, proportion.

Just as informative was Leon Shulman's "Wing Loading at a Glance." Now living in New Jersey and still in touch with us here at *MAN,* Mr. Shulman provided a weight/ratio chart that would help modelers to determine whether their planes satisfied NAA contest rules and what the weight of a plane should be for a specific wing area and vice versa. Go for the "minimum allowable wing loading," he advised!

If all this wasn't enough, modelers with sufficient energy could go on to read "The Physics of the Airplane" by Eames and Nye, or "Streamlines" by Roy Marquardt. "Why streamline?" asked Marquardt, when it's much easier to make a simple box fuselage. Of course, he had the answer (supported by lengthy experimental evidence): " A single square foot of flat plate moving at the speed of a Thompson Trophy winner gives a drag of 240 pounds!—a good, heavy weight to pull around! ... It needs 120hp just to keep it traveling at that speed ... . " He pointed out that "even at 20mph, a big, square, not-untypical firewall can "absorb 1/5 of the horsepower of a Brown." After reading his article, there was surely no doubt in anyone's mind that streamlining was an absolute necessity, and he also explained lift, and how this is affected by airfoil and wing camber.



Nats Berryloid Winners: Joe Raspante, C. Siegfried and Mike Roll.

Readers could put all this technical information to immediate use, as the issue contained plans and instructions for two planes. Jesse Davidson presented the Fairchild 82—a realistic, rugged, scale model based on the durable, versatile full-scale monoplane with folding wings that was being much used for freighting between the railways and mining districts of Northern Canada. The Canadian version carried 12 passengers and could easily be converted to floats, wheels, or skis. Less predictable and durable was its replica, which relied on "six strands of 1/8-inch flat, *fresh* rubber."

In "Frontiers of Aviation," Robert C. Morrison was enthusiastic about the capabilities of a new British plane: the Bristol Beaufort. The speed of this reconnaissance torpedo bomber hadn't been disclosed, but the author thought it would be more than a match for "those Heinkels and Messerschmitts that are reported to be getting closer and closer to the *500mph* mark." If the Beaufort was to do any fighting, " ... it would be against those two German planes."(As I read about the spectacular machines displayed at this year's Paris Air Show, I couldn't help but wonder what Morrison would say about the sleek American spy plane—the Lockheed SR-71—that cruises above 80,000 feet at speeds of about *3,100 feet per second;* that's *three times* the speed of sound!)

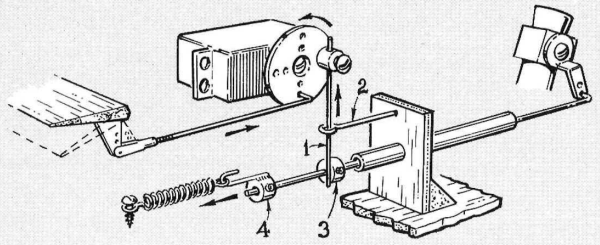
Emphasizing the rapidity of aviation development, Morrison said that wing fillets, which had first been "startling," were "now customary"; wing flaps had "come and gone and then reappeared"; nose wheels were "on one month, and off the next"! *Everything* was being tried, and war was on everyone's mind. As air power became increasingly vital, aeromodeling increased in popularity, and no doubt, with the radio telling the gloomy European news, it was good to retreat, with *MAN,* to the basement workbench.

Finally, I'm indebted (through clenched teeth!) to those of you who wrote to tell me that, contrary to my first paragraph in June's issue, Charles (Lucky Lindy) Lindbergh was *not* the first to fly across the Atlantic. His was, of course, the first *solo* flight. One Canadian writer even accused me of chauvinism, saying I'd deliberately *ignored* the earlier, very British contribution of Alcock and Brown. Since I carry a British passport, call me ignorant, but never a chauvinist; I blew it! So what do you care if I lose my job and get thrown out on the street? I *was* going to say there are no flies on fliers—until I noticed that you *didn't* comment on June's incorrect spelling of Lindy's name!

Fifty years ago, MAN was already 10 years old; let's shoot for 100! ■

Hints & Kinks

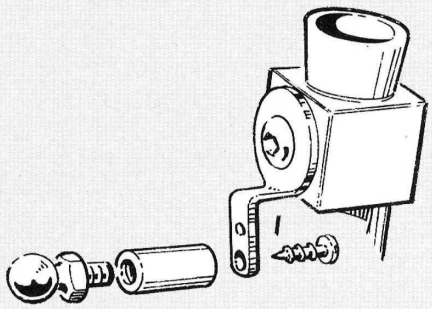
by JIM NEWMAN



ENGINE CUT-OFF

This is great for 2-channel radios or limited-engine-run events. A quick jab of full-down elevator withdraws trigger wire (1) from behind the stop collar (3), and this allows the spring to pull the throttle pushrod all the way back to the closed position. Item 2 is the trigger-wire guide, and the collar (4) allows the spring tension to be adjusted. The pushrod runs in the usual nylon tubing, but I wonder if the guide should have a nylon bushing to guard against the possibility of metal-to-metal-generated RF "noise"?

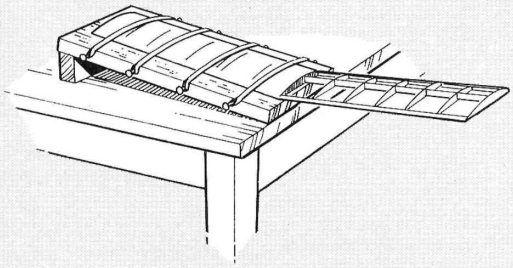
Fred Mulholland, Tampa, FL



THROTTLE-ARM STAND-OFF

There are times when the throttle pushrod has to be offset to clear something, and some 4-stroke engines, like the Enya 120, could use a stand-off as a matter of course. Walt put this one together using a piece of Sullivan yellow nylon tube, a No. 2 sheet-metal screw and the ball part of a ball joint screwed into the tube.

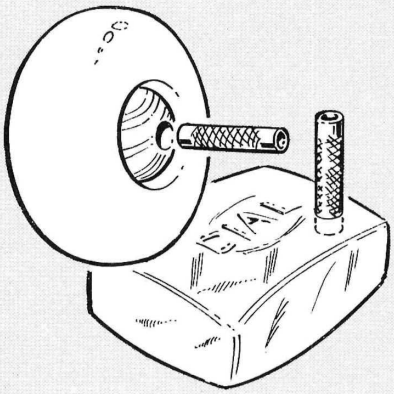
Walter Allen, Flora, IN



THIRD HAND FOR COVERING

Holding a large wing while applying the covering material can be tricky. A 2-foot piece of 2x10-inch board with some hooks or nails in its edges will hold the wing nicely if some rubber bands are stretched across, as shown. If required, a block can be nailed under the far end to make the overhanging wing level. This will work very well, even if the board is shorter than the wing.

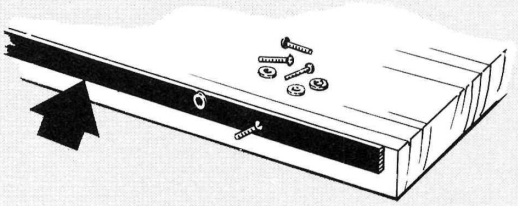
Joseph Kmetz, Huntington, CT



EPOXY-FREE BUSHINGS

For smoother running, those delightful, vintage-style Trexler balloon wheels need metal or nylon bushings in their wooden hubs. To prevent the bushing from being plugged with epoxy as it's pushed through the hole, poke its end into a bar of soap. This creates a neat, easily removable soap plug that prevents glue from entering. Note the bushing cross-hatching, which is made with a file or sandpaper to help the glue grip better .

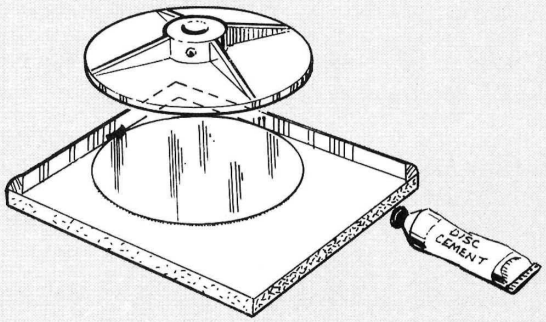
Gene Chase, Oshkosh, WI



MAGNETIC TRAP

Loose screws and washers won't roll off your workbench if you stick a strip of magnetic material along its edge. This strip is available from Radio Shack or your local refrigerator-service shop. Of course, this won't work with *brass* screws.

Kjell Risholm, Breim, Norway



SANDING-DISC LINE-UP JIG

This hardboard square has pieces of wooden beading glued along two sides to form a 90-degree angle. When attaching a sandpaper disc, put it in the jig, sticky side up and touching both wooden strips. Now lower the glue-coated metal plate onto the sandpaper disc, making sure that it, too, touches the wooden strips as it's lowered. Your sandpaper will be centered on the metal backplate every time.

Bob Robert, Durrington, Wilts., England

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

Sheri Smothers thinks Diamond(s) are a girl's best friend.

SPECIFICATIONS

Wingspan: *44 inches (top); 24 3/4 inches (bottom)*
Length: *31 1/2 inches*
Weight: *31 ounces*
Wing Area: *434 square inches*
Wing Loading: *10 ounces per square foot*
Power Req'd: *.10 to .15 2-stroke*
No. of Channels Req'd: *4*
Materials: *Balsa and ply*

MISS DIAMOND

by RANDY RANDOLPH

THE GIFT for a 60th anniversary is diamonds, so what could be more appropriate for this issue than a nostalgic little bipe by that name?—and this Diamond *does* sparkle! With a good .10 or .15 engine up front, it will do just about any trick you can think of, and it's even forgiving if you get a little too rambunctious.

The design should look familiar, because it's a blend of Waco, Porterfield, T-Craft and Champ, with a little of Joe Wagner's Dakota thrown in for good measure. Since there

This Diamond is also MAN's best friend!

PHOTOS BY RANDY RANDOLPH

are no interplane struts and no rigging, it's a nice, clean airplane that has most of the good things of biplanes with almost none of their drawbacks.

This plane can be frisky or gentle; just a little change of the throttle setting is all that's required to change its style. Stalls are straight ahead with no tendency to snap, yet it will snap all over the sky if you want it to. If you've never played with a little bipe, now's the time to get acquainted with the Diamond!

THE WINGS: Biplanes need a few more ribs, but once they're made, there isn't a great difference between a long, single wing and two smaller ones! Two sizes of ribs are needed, and the easiest way to make them is by pinning stacks of 1/16-inch sheet-rib blanks together and sawing, sanding, or carving all the ribs of a particular size at one time. Alternatively, cut out the ribs individually by making a template for each rib size and tracing around it with a fiber-tipped pen on 1/16-inch sheet. Don't forget to trim 1/16 inch from the top and bottom of the four center ribs in each wing so the center sheeting will be flush with the rest of the wing.

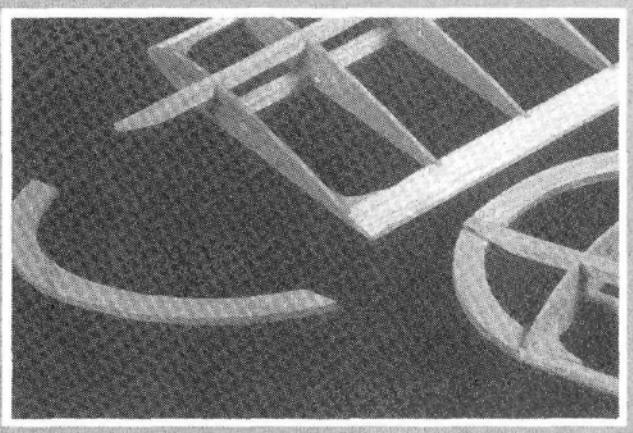
Build the two top wing panels first by pinning the bottom main spar and the bottom trailing-edge sheet in place over the plan and adding ribs and webs, then the two top spars and the leading edge. Add the 1/16-inch-square trailing edge at this time, but don't add the top trailing-edge sheet until after both panels have been joined with the dihedral braces.

Remove the wing from the plan and add the bottom main spar. Build the two tips over the plan and trim the top spars to lie flush against them when they're lifted up into place. Trim the bottom spars flush with the end rib, and use scrap spar material to fill in from the spar stubs to the tips. Bevel the center spars to the dihedral angle and join the panels with the braces. Cut the two center ribs at the main spar notch and separate the aft parts to form the servo well, then sheet the center section with 1/16-inch balsa and add the top trailing-edge sheet. Sand the finished wing and install the aileron hardware, but don't add the ailerons until the wing has been covered.

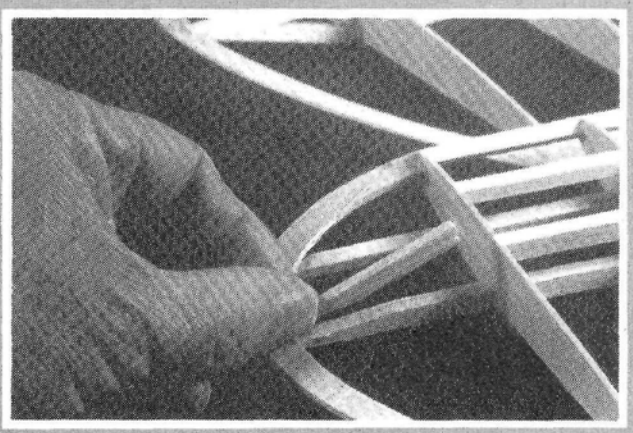
The bottom wing is a snap! The trailing-edge stock is notched to accept the ribs; otherwise, it's built right over the plan, just like the top wing. Only the first bay outboard of the center sheeting needs a web between the top and bottom spars. Epoxy a piece of 1/16-inch music wire to the trailing edge at the center, so that the rubber bands won't dig into the trailing edge in this area. After the wing has been sanded to remove any fuzzy or rough areas, it's ready for covering.

The stab, elevator, fin and rudder are built right over the plan. The elevator carry-through can be 3/16-inch hardwood dowel or 3/16-inch-square spruce or pine. If you glue the carry-through into place before making the rudder cutout, it will be easier to keep things in line.

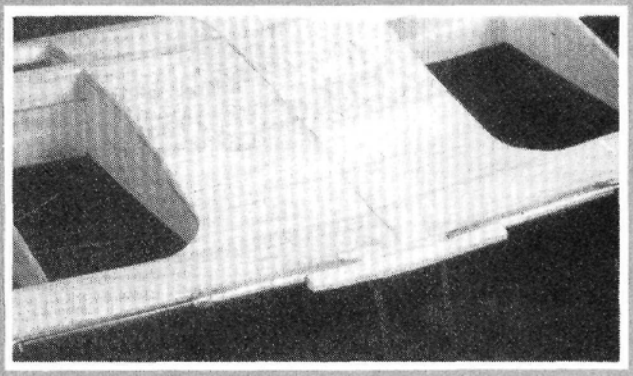
FUSELAGE: The fuselage sides are three sheets of 36-inch-long 1/16x3-inch balsa, and there's some left over to help with the top and bottom sheeting. Cut one sheet in half and edge-glue each half to one of the full-length sheets so that the square ends are in the right place to form the front of the cabin. Trace the fuselage outline on the two prepared sheets and glue the 1/8-inch doublers and the 1/16-inch ply trippers as shown on the plans. Add the 1/8-inch-square longerons and uprights; pin the two sides together with the doublers and longerons to the outside, then sand both sides to the same shape. While the sides are joined, drill the holes for the wing-



The wing tips slant up to meet the top spars, which are trimmed to blend into the tips. Bottom wing shown.



The bottom spars are trimmed flush with the tip rib, and scrap spar material is used to fill in between rib and tip. Top wing shown.



Aileron torque rods are made of 3/32-inch wire slipped through 1/8-inch tubing and bent to shape. Scrap-fill at center blends the wing into the fuselage.

mounting dowels, then separate the sides and cut the pushrod exits.

Cut out the two 1/8-inch plywood cabin formers and the 1/8-inch balsa servo mount. Cut the tank opening in the forward cabin former and glue the aft cowl former into position as shown, then drill it for the throttle line. Make cutouts for the tank and servos in the servo mount, and reinforce the mounting areas of the servo cutouts with strips of 1/8-inch ply cemented to the bottom of the mount. Drill the tray for the servos.

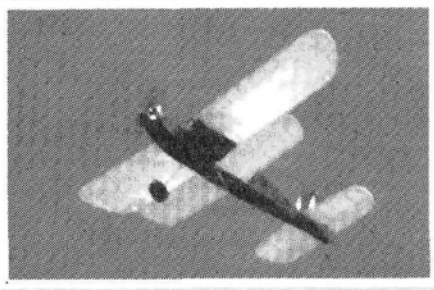
Position the two cabin formers on one of the fuselage sides with the servo mount between them. Use a square to be sure that all are at right angles to the side, then glue into place. Position the second fuselage side over the first, and when everything has been aligned, glue it to the formers and mount.

Bevel the tail post, then pull the tail together, check its alignment and glue. Cross-sheet the fuselage top and bottom from the aft cabin former to the tail post with 1/16-inch sheet balsa. (Note the 1/16-inch ply inlay for the tail-wheel mount.) Build up and install the landing-gear mount. Cut out and drill the fire wall to accept the throttle, fuel and overflow lines and the engine-mount bolts. On the rear side, install T-nuts for the mounting bolts and 1/8-inch copper tubing for the fuel lines, then epoxy the fire wall into place between the fuselage sides. Install the tank, then run the inner Nyrod throttle line and finish the bottom sheeting.

The cowl/turtle-deck sheeting is added first, then the center windshield piece followed by the side panels. Trim the cowl to fit the engine by bolting the engine mount to the fire wall so that the engine can be used as a check. Make sure there's enough clearance for the muffler. Remove the engine, and mount and paint the inside of the cowl and fire wall with epoxy to protect them from fuel and oil. Check the completed airframe for any dings or gouges, and fill them before covering.

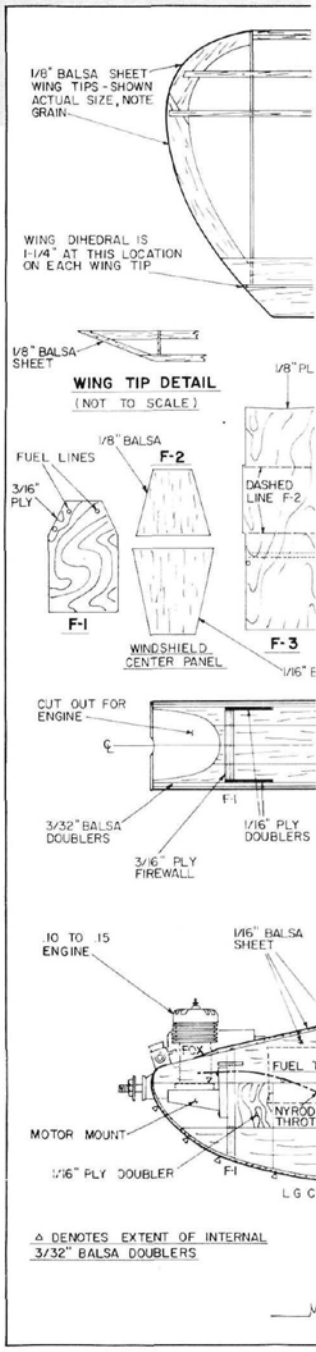
Sand everything once more with fine sandpaper. Now it's time for covering. The original was covered with Coverite's* Black Baron film, and this material was also used for the hinges. Follow the manufacturer's instructions for the film of your choice. After covering, epoxy the wing-mounting dowels through the previously drilled holes.

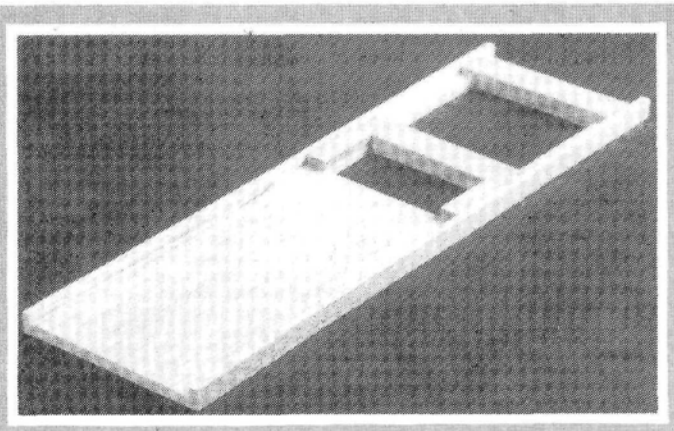
Make the landing gear by bending 1/8-inch music wire, and install it in the gear mount with clips and small wood screws. The 2 1/2-inch lightweight wheels can be held on the axles with wheel collars. The tail-wheel mount is cut from 1/8-inch plywood, drilled for a 3/32-inch brass bearing and secured through the mount with thin CA. Make the tail-wheel axle by bending 1/16-inch music wire, solder the retaining washer below the bearing, then slip it through the tail-wheel mount and



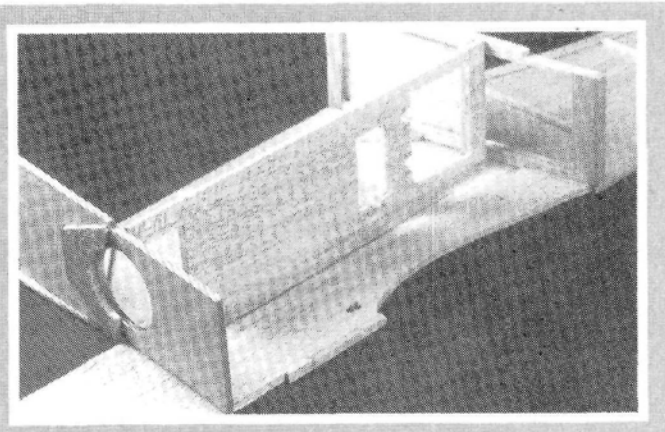
#9891 Miss Diamond $7.50

We asked Randy Randolph to help us celebrate our 60th (Diamond) anniversary by designing what he thought would be a perfect little biplane that would have broad appeal for all R/Cers. It should be small, but easily able to handle moderate breezes; economical (.10- to .15-powered); of simple construction, so it won't confuse the beginner; and easy to fly. Miss Diamond is the result. A 44-inch wingspan with a cabin configuration fuselage eliminates those pesky wire-strut-bending chores. We expect this design to be popular for the *next* 60 years! Balsa construction. Single-sheet drawing.



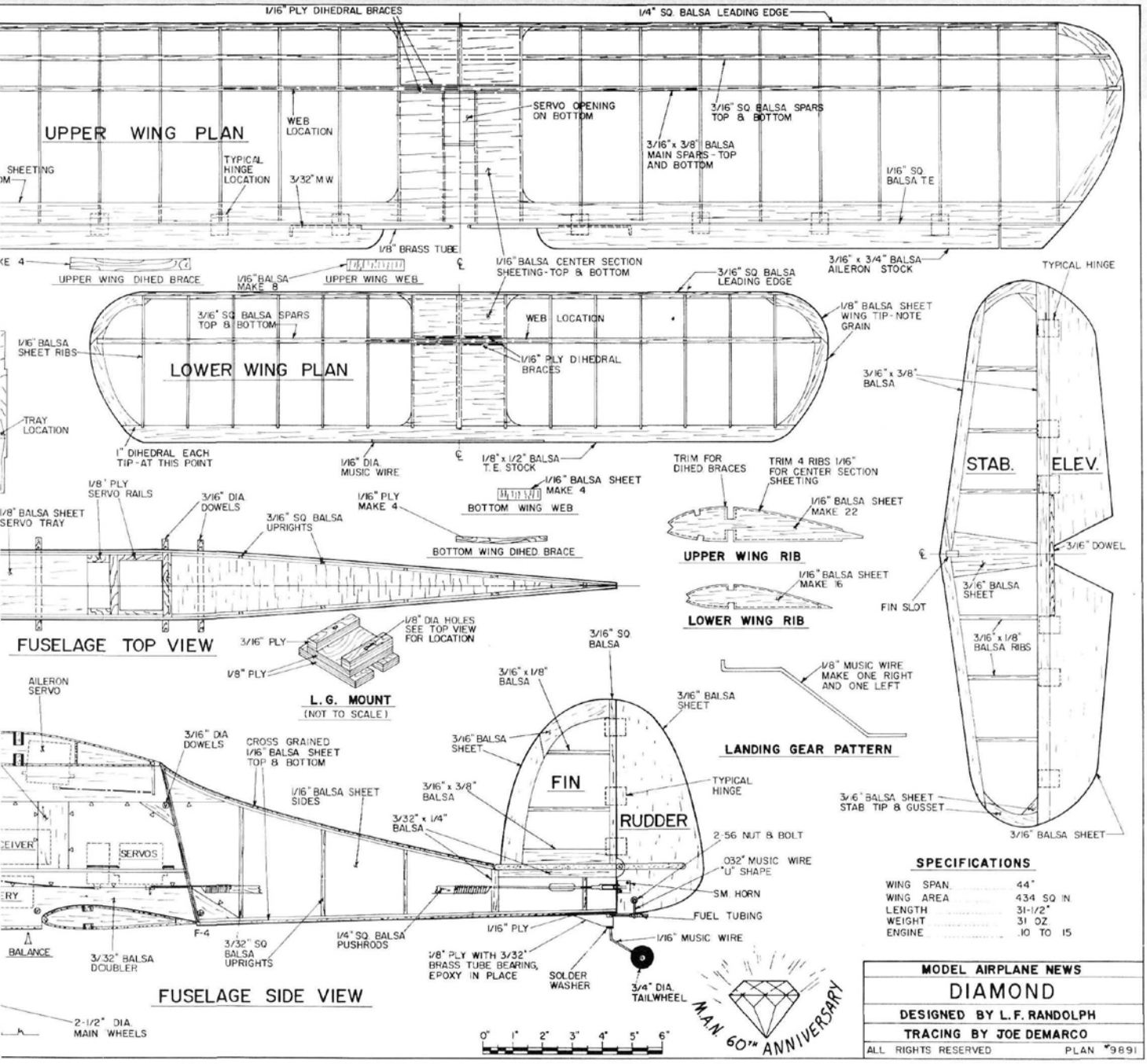


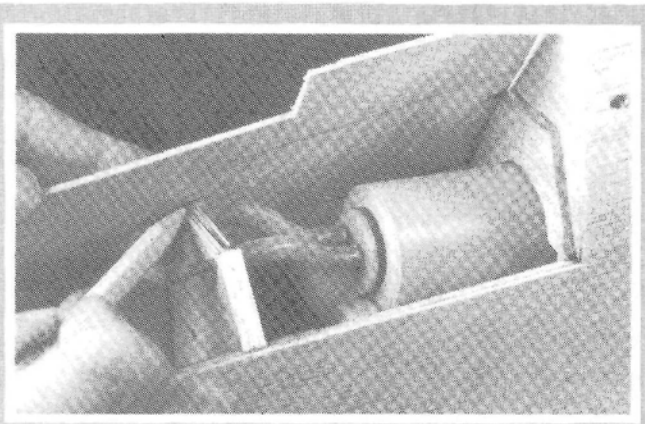
The servo-mounting tray extends between both fuselage bulkheads. Note the 1/8-inch plywood doublers on the top of the servo cutouts.



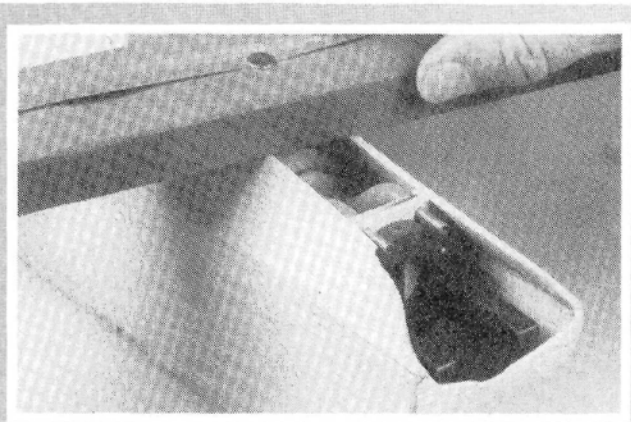
Both cabin formers and the servo tray are glued to one side; the other side is then added. Note that former F2 is glued to the front of former F3. The round cutout in F3 receives a rather long, round tank.

ORDER THE FULL-SIZE PLANS ... PAGE 128

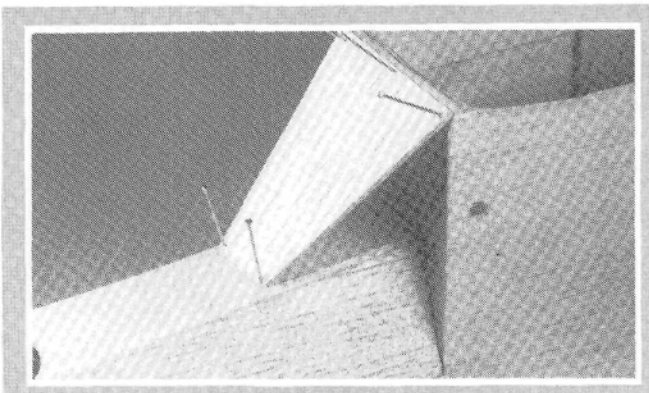




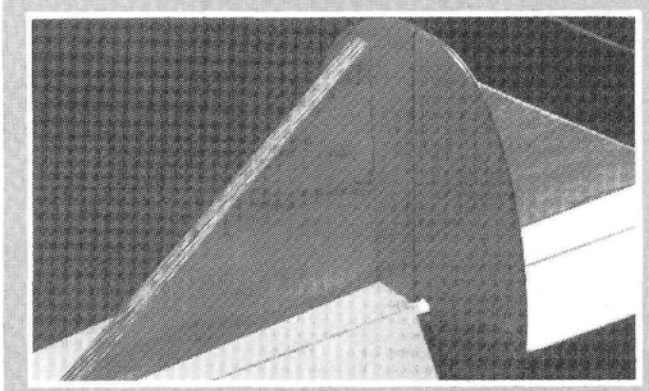
The cowl sides are made by fitting sheet balsa between F3 and the nose and marking the top of the formers; a straightedge is then used to trim them into shape.



When both sides are in place, sand them flush with the top of the formers, and add the top piece. Trim the nose to receive the engine.



Glue the front windshield sheet into position, and add the side panels in the same manner as the cowl sides.



Plywood right triangles make a great jig for gluing the fin rudder in place on the stab. Don't forget to trim the covering away for a wood-to-wood joint!

form the tiller. Epoxy the assembled mount into place.

This is one small airplane with plenty of room for a radio, which is installed in the fuselage in two sections. The elevator, rudder and throttle servos are mounted through the lower wing opening, and the battery pack and receiver are mounted through the top. Make a plywood tray for the aileron servo and glue it into the wing's center cutout. Connect the ailerons with standard hardware. Make the elevator and rudder pushrods with medium 1/4-inch-square balsa. The throttle line is made of soft iron wire through the inner Nyrod.

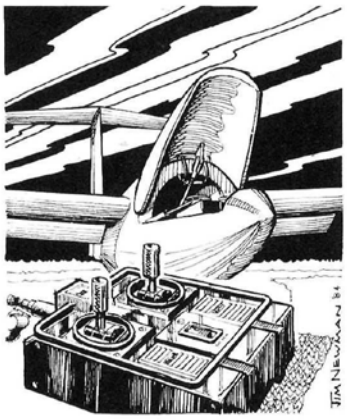
When all the servos are installed, balance the airplane by shifting the battery pack forward or aft in the cabin and securing it in the proper location. Set the control-surface movements measured at the trailing edge of each control as follows: elevator, 3/4 inch up and down; rudder, 1/2 inch left and right; ailerons, 1/4 inch up and 3/16 inch down. Range-check the equipment, and the airplane is ready to fly.

PERFORMANCE: This isn't a trainer, so don't expect it to fly like one. On the ground, and at low speed with power, the rudder is very effective, so be gentle with it during takeoff and landing. The ailerons provide a roll rate that's about right for most sport flying: neither too fast nor too slow. The elevator will allow a full-stall landing with no tendency to snap, and it will provide the ability to perform nice loops. Intentional snaps require the momentary addition of power to provide the initial kick at the start of the maneuver. Snap and spin recovery is rapid.

On the first flight, taxi around for a while until you're comfortable with the feel of the rudder. The airplane wants to roll straight and will do so unless affected by an outside force. To take off, apply full power, and when the tail clears the ground, the airplane will fly. With .15 power, the climb angle can be quite steep, but on the initial flight, hold it down until some altitude is reached and any necessary trim has been added.

At altitude, try several stalls to get some idea of the landing speed, then set up the approach. At full idle, make a slightly steeper approach than with a trainer-type airplane, and aim at the end of the runway. Then, simply hold it off until the speed dies off, keeping the wings level with the ailerons. The landing speed is slower than you'd expect, and the Diamond is cleaner than it looks, so watch out for ballooning. After a little practice, tail-wheel-first landings will be easy and fun!

**Here's the address of the company mentioned in this article:*
***Coverite**, 420 Babylon Rd., Horsham, PA 19044.*■



Quiet Flight

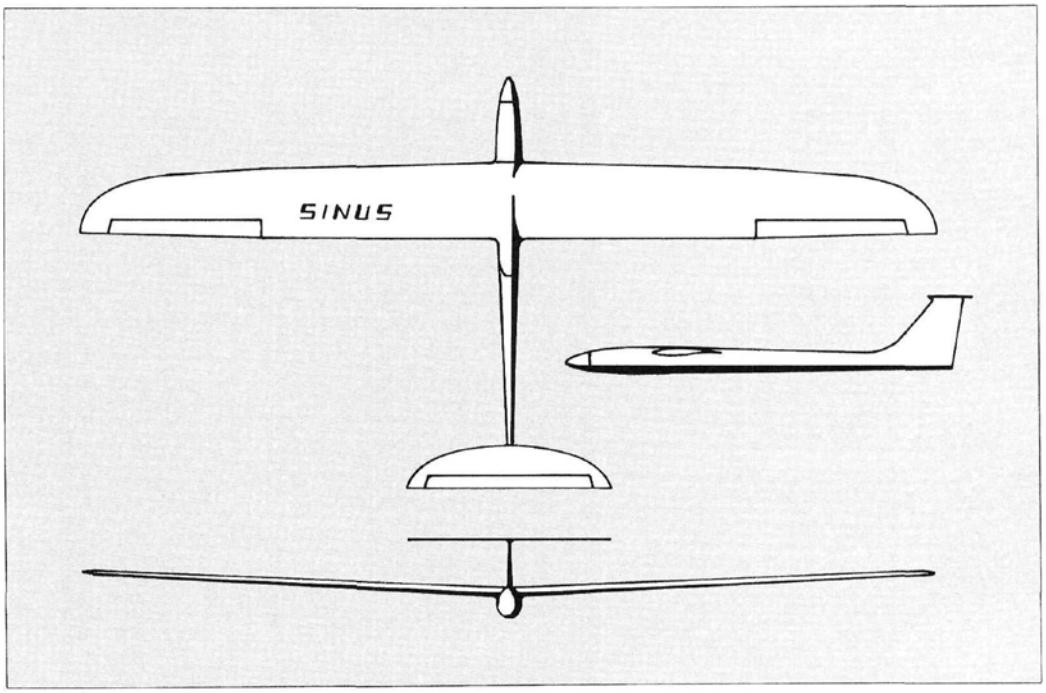
by JOHN LUPPERGER

A COUPLE OF months ago, I opened my column by asking, "What have you given back to your hobby lately?" Recently, I've had an opportunity to give something back by helping two retired gentlemen with their electric models (one was a newcomer, and one was returning to the hobby after many years). Their models both needed trimming, a little rebalancing, different trim settings for power on/power off, and a little less control throw. To an experienced modeler, the changes I made were minor, but not to these gentlemen. The look on their faces as they completed an entire flight on their own is hard to describe. I *love* this hobby!

New Products

Last month, I reported on several new products from Hobby Lobby.* As promised, here are the rest of the new products:

The Sinus is a competition 7-cell F3E sailplane. The kit features an epoxy-glass fuselage and pre-sheeted balsa-covered foam cores. The wing utilizes the highly efficient Schuemann planform and a modified Eppler 222 airfoil. Controls are: motor on/off brake; aileron; elevator; and aileron air brakes. The Sinus can be built with a 71- or 79-inch wingspan, which yields an area of either 410 or 465 square inches. The recommended flying weight is between 42 to 65 ounces. This is one hot-looking plane!



Three-views of the Sinus F3E 7-cell sailplane from Hobby Lobby. Model has extremely clean lines; should be a hot performer.

The rest of the new goodies from Hobby Lobby encompass a wide variety of motors and props. Hobby Lobby now has the biggest selection of folding props and electric motors available in the U.S.

Many of you saw the review I did on the Graupner UHU. This model used the Speed 600 motor with a 7x3 folding Scimitar prop. Three new systems join the ranks of the UHU flight system:

- The direct-drive Speed 600, with 8x4.5 Scimitar prop, is for 8.4 to 9.6V operation, and is designed for 2-meter sailplanes up to a maximum weight of 70 ounces.
- The direct-drive Speed 500BB, with 6x6 Scimitar prop is for 7.2V operation, and is designed for 1-meter-span pylon racers up to 42 ounces.
- The direct-drive Speed 700 Turbo, with 10x6 Scimitar prop is for 7.2 to 12V operation and is designed for 2.5-meter sailplanes, up to a maximum weight of 88 ounces.

The motors can also be bought without the prop and spinner. Now there's a reasonably priced, high-performance Ferrite motor for every type of flier.

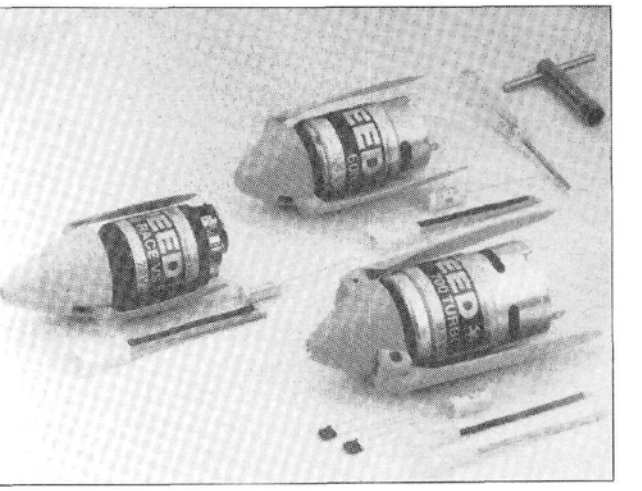
If you want more performance, three new motor sizes have been added to the Ultra motor series, and they feature Samarium Cobalt magnets, special armatures and brushes, ball bearings, and a slim case design.

The Ultra 800 is for 8.4V operation and will work in gliders and pylon racers. The Ultra 900 is for 9.6V operation in slightly larger or heavier aircraft, and the Ultra 2000 is for up to 24V operation and is capable of launching models up to 5 meters in span.

Hobby Lobby is also introducing a completely new line of motors known as the GT 300s. These motors are all of the same physical size, but they have different voltage capabilities. I assume this means that they're wound differently.

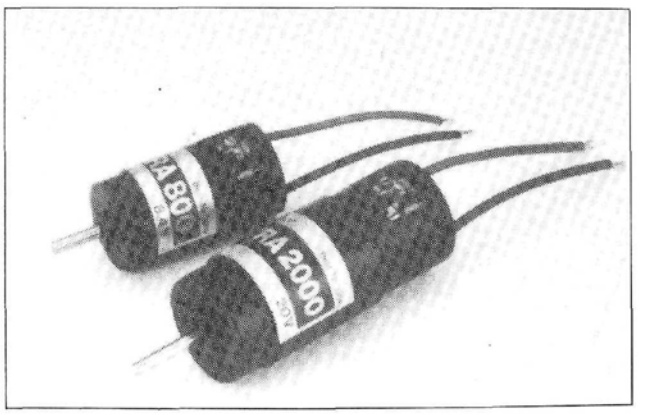
The motors feature "rare earth magnets" that produce field densities about 20 percent higher than Cobalt magnets. Featuring four brushes for better current passage and longer brush life (approximately 500 hours), they're listed as the GT 300/7 for 6 to 18 volts, the GT 300/10 for 10 to 30 volts, and the GT 300/14 for 14 to 42 volts. If these motors live up to their manufacturer's claims, they may be the most powerful electric motors available!

Two lines of folding props are now



New Speed motors and props from Graupner are available from Hobby Lobby. Inexpensive motors with Scimitar folding props are good performers for a variety of model sizes.

available from Hobby Lobby: the Graupner Scimitar props with spinner, and the Freudenthaler props with aluminum hubs. The Graupner Scimitar prop line now includes six sizes: 6x6, 7x3, 8x4.5S, 8x4.5L, 10x6, and 11x7. The 8x4.5 is available with either a long or a short spinner. These nicely crafted props are very efficient and have an excellent folding angle for low drag. The backplate for the spinner is actually the prop hub. This backplate hub houses the slide collet that tightens up on the motor shaft as the prop nut is tightened. This eliminates set-screw-type motor adapters.



New Ultra motors are for serious electric enthusiasts who want the kind of power that comes from Samarium Cobalt magnets.

The Freudenthaler props also have a "Scimitar"-shaped blade made of white polymid with a 35-percent glass fiberfill for extra strength. They're available in: 9.5x5, 11x6.5, 12.5x6.5, 13.5x5.5, and 14x8.5 sizes. There's also a $1^{9}/_{16}$-inch spinner that fits the aluminum hub, as well as four different prop-shaft adapters.

It looks as though Hobby Lobby will definitely be the place to shop for electric-flight products. Send for their free No. 14 catalog, and tell them you saw it in *Model Airplane News*.

ISS 6th Annual HLG Contest

On June 4th, 33 glider guiders got together for the Inland Soaring Society's 6th Annual Hand-Launch Glider Contest. Considering what a specialized event this is, that kind of attendance is pretty amazing after six years.

The rounds have followed the same format for the last few years, and most of the contestants seem to like the variety it offers. All three rounds have a 10-minute working time in which the tasks are performed, and they must be finished. Round one has unlimited throws, with the longest flight being the only one that counts. Round two has unlimited throws for a 5-minute precision duration. Round three allows six throws with the best five flights counting and a 2-minute max on any one flight. All rounds are scored man-on-man with the winner receiving 1,000 points, and all others, a percentage of 1,000, according to their times compared with those of the the winners.

I'm not going to give a blow-by-blow account of the contest, but rather an overall view of how the rounds were won. The weather was overcast for most of the day, but the sun finally broke through in the afternoon. At 8 a.m. there seemed to be thermals everywhere, but by the the time things got under way (a little after 9 a.m.), there was very little lift.

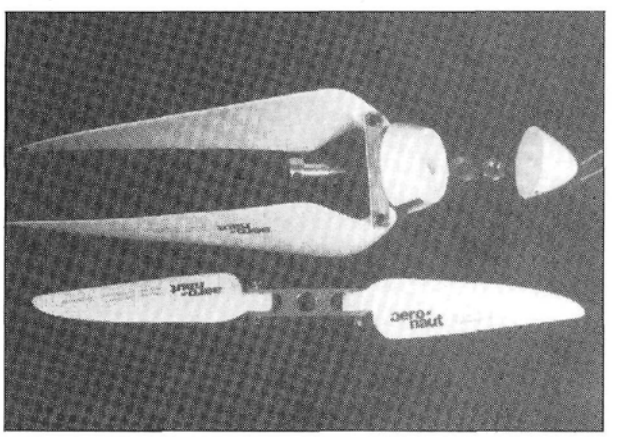
In round one, flight group one had the best time of 2:47; flight group two had 3:30; flight group three, 1:54; flight group four, 3:22; flight group five, 9:46 (only 14 seconds short of the full 10-minute working time), and flight group six finished with 6:52. You can see by the times how the lift changed during the early part of the day.

In round two, one person in each flight group got exactly 5:00.

In round three, flight group one was won with a time of 2:43; flight group two with 8:40; flight group three with 4:38; flight group four with 4:49; flight group five with 8:18; and flight group six with 5:34.

When the dust had settled, the top three finishers were:

- 1st: Todd Billman, flying an Illegitimate Lady (shrunk-down Sophisticated Lady)
- 2nd: Larry Jolly, flying his own design—the Flinger
- 3rd: Joe Wurts, flying an unnamed original foam-core, glass-bagged model.



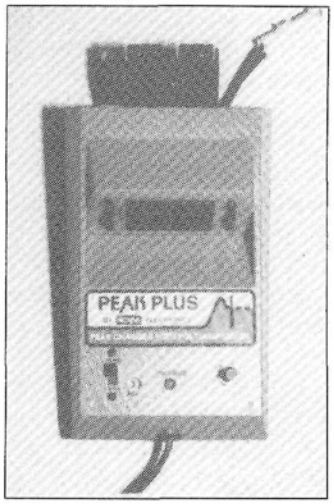
Freudenthaler folding props are designed for larger electric flight systems. Sizes range from 9.5x5 to 14x8.5.

QUIET FLIGHT

If you aren't already flying an HLG, I strongly urge you to try one. It's great fun, and you'll be amazed at how much you can learn about thermalling with these diminutive gliders. And don't let anyone tell you that you have to be a fast-ball pitcher to get them up; it just ain't so!

Peak Chargers

Last month, I mentioned that I was trying out Tekin and Novak peak chargers. The Tekin model, the BC 100S, is the company's newest base model. It features: 2-9A adjustable current; 4- to 7-cell charging capacity; plug-in jacks for external voltmeter; and overload protection. It will charge all SCR, SCE, SC and other types of cells of 100 to 4000mAh capacity, with charging power provided from any 12V power source.

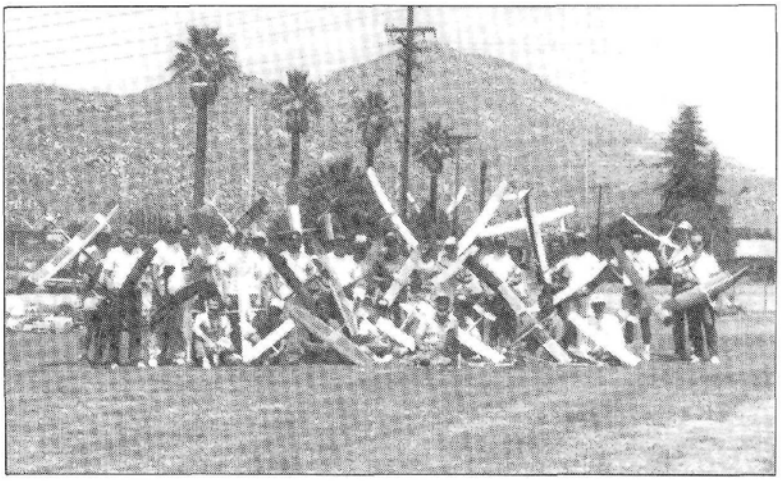


Novak's Peak Plus charger has a volt/amp meter to easily monitor charge conditions. Model has switchable amperage rate for 3 or 4.5A charge rates.

The Novak Peak Plus model features: a digital volt/ampmeter with 9V battery; "switchable" read-out from amps to volts; 4- to 7-cell charging capacity of 100 to 4000mAh batteries; choice of two charge rates of 3 to 4.5A; low-end amps that can be adjusted from 0 to 3.5A for low-capacity cells; and an internal circuit breaker to protect against shorts and overloads.

Although the two units are at opposite ends of the scale (Tekin BC 100S is a basic model, and the Novak Peak Plus is their top-of-the-line model), they do basically the same thing: They pulse-charge batteries and detect charge peak and then go to an automatic trickle.

So far, I've only used them a few times, but I'm impressed with their easy operation. Both units have an LED that indicates fast-charge or trickle-charge, and both units have operated flawlessly. I've noticed about a 5-percent increase in run times with batteries that had previously charged on a conventional charger. If



Thirty-three pilots showed up for the ISS 6th Annual HLG contest in Riverside, CA. HLG contests are very exciting and a great way to test your flying ability.

Tekin's new BC 100S peak-charger takes all the worries out of battery charging. The new model has a switch for different pulse rates for SCE or SCR cells.

what the car people tell me is true, we can expect more power from our batteries at the very beginning of the flight and longer motor runs. I'll keep you updated.

Next month, look for a progress report on Larry Jolly's "Winsome."

Till next time ... good thermals and a full charge!

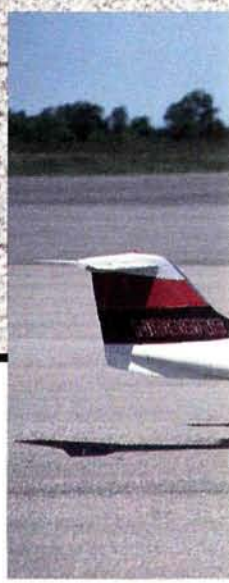
**Here's the address of the company mentioned in this article:*
***Hobby Lobby International**, 5614 Franklin Pike Circle, P.O. Box 285, Brentwood, TN 37027.* ■

1989

BAY OF QUINTE FAN JET RALLY

by MARK FRANKEL

Colorful "E" model F-4 from the new Yellow Aircraft kit. Single Dynamax powered with bifurcated tailpipe.



Great turnout, great jets, in spite of the weather!

ON MY TRIP to Belleville, Ontario, the rain was truly of biblical proportions—like a scene from the tale of Noah's Ark. I endured an 8-hour drive through torrential rains so that I could visit old friends and see some of the best jet models from the eastern United States and Canada. One forecast predicted clearing by late Sunday afternoon and, with luck, I

(Continued on page 35)

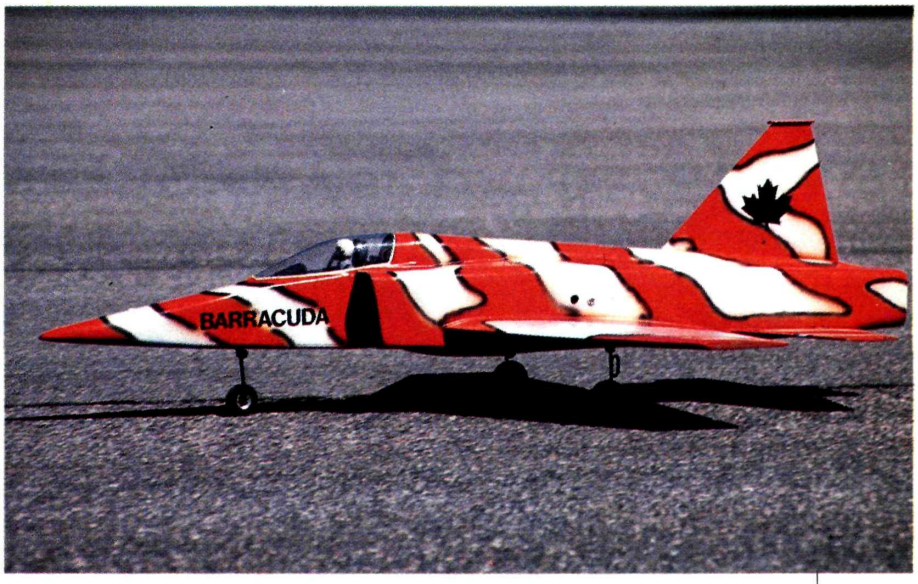
Dennis Crooks' twin Dynamax powered F-14A Tomcat. Flew well despite strong winds.

Dwight Aube with his "Coke Machine."— highly colorful Jet Model Products Starfire II.

PHOTOS BY MARK FRANKEL & ANTONIO NUNEZ

Left: One of a number of F-16s on hand, this one being flight prepped by Dennis Crooks.

Ian Ward's F101 Voodoo. An original design that's scheduled to be a Model Airplane News construction feature.



Above: The new Bob Parkinson Models Barracuda was colorful by anyone's standards. A balsa-and-foam design.

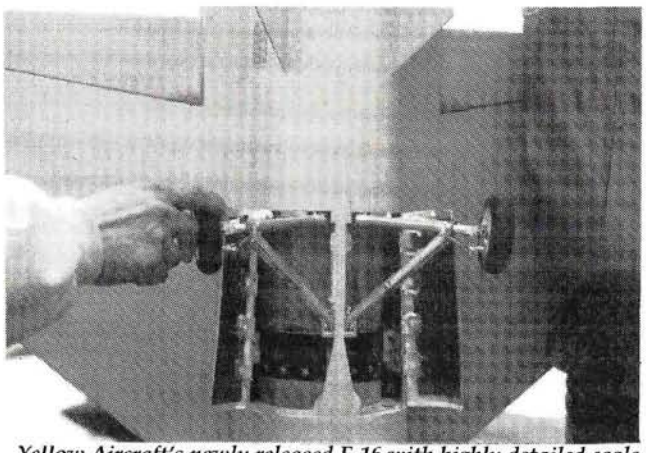
Left: Our author's award-winning Lear 35A taxiing by, ready to take the active.

(Continued from page 32)

thought I'd have just enough flight time before repacking my airplane and heading for home.

When I arrived at the Mountain View Airport on Saturday, the rain had turned to drizzle, but the wind was at a steady 28mph. To my surprise, a few brave modelers lit off their fans and battled the wind. The smaller high-performance jets had no problem. Downwind passes approached light speed, but the models handled well. Landings were challenging, since the slightest positive angle of attack at a reduced power setting would cause the models to "balloon" violently. The only technique that seemed to work was flying the aircraft onto the deck in a level attitude.

The Yellow Aircraft Group (Bob Fiorenze, Ronnie Kemp, Bill Harris and Dennis Crooks) had at least one aircraft in the air most of the day. Their recently released F-16 and F-4 penetrated the wind fairly easily, and a prototype F-20 was equally adept in the rough wind.The large-scale twins, however, such as the SR-71, F-15 and F-14 were prudently grounded. I was especially impressed by the Yellow Aircraft F-16's performance. Slightly smaller than the Byron F-16 and powered by an O.S. 77/Dynamax combination, its slashing speed was demonstrated by Bob Fiorenze. This model uses the scale inlet with no "cheater hole" to feed air to the fan. Its speed seems to approach that of a Violett Aggressor—clearly in the 150 to 160mph range.

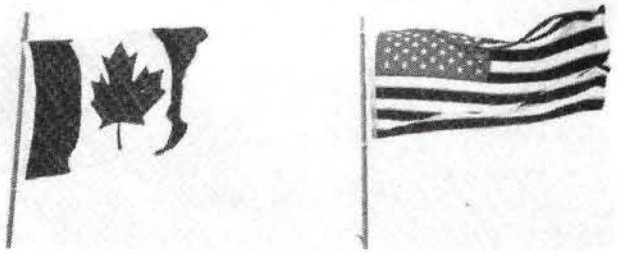


Yellow Aircraft's newly released F-16 with highly detailed scale landing gear that will become available as an option to the kit.

Ian Ward of Trenton, Ontario, taxied out his F-101B Voodoo. To simulate the twin engines of the full-scale Voodoo, he used a single Viojett fan with a K.B.V. .72 engine in a bifurcated exhaust duct. This model's wing area is particularly limited, but it's surprisingly docile in the air. Like the Yellow Aircraft F-16, the Voodoo had no problem with the wind. In the near future, Ian expects to sell fiberglass fuselages for his design, and it may be featured as a construction article in this magazine.

Dwight Aube of Wrentham, MA, flew a very handsome Starfire II from Jet Model Products. He calls his model "Coke Machine," because it's painted in the exact markings of a full-scale high-performance variant of an average Coke machine. Dwight even managed to apply small Coca Cola logos to add a touch of authenticity to the markings. It

1989 BAY OF QUINTE FAN JET RALLY



QUINTE 1989 OVERVIEW

by PETER SANT, FAN RALLY DIRECTOR

THE QUESTION most often asked by visitors to the area was, "Does Quinte mean cold and windy?" Once again, the weather was unfavorable most of the time, although Sunday was sunnier and warmer. I guess the club will just have to keep on holding Jet Rallies until we get the weather right!

We had 65 registered fliers (28 Canadian and 37 American) with 97 aircraft. Wind conditions made flying difficult, but pilots weren't deterred, and almost all the aircraft flew. Each pilot was allowed to choose flying times on both days, and most seemed to favor this approach. The few crashes we saw seem to have been caused by mechanical failures, such as weak receiver batteries, and there were no radio-interference problems (frequency control was strictly enforced). Saturday's social gathering at the club's field was attended by more people than usual; no doubt, they'd heard about the fantastic desserts!

Fewer major manufacturers attended this time, but fliers brought many more varied aircraft. Some of the most remarkable were Mark Frankel's Lear Jet and Terry Best's two scratch-built Invaders, which were powered by .45s. (They were among the fastest aircraft at the meet.) A fully operational Harrier Jump Jet was a first for the event and was proof that the technology is available for this type of model.

Over the two days, more than 5,000 spectators attended, and, considering the weather, this was very encouraging. Interest in model jet flying is growing locally, and we're starting to see spectators from areas as far away as 500 miles. They have to be really enthusiastic to come that far!

The usual draw was held for registered pilots. Prizes were a pair of A-4 Skyhawks donated by Yellow Aircraft and a beautiful door latch donated by Emhart Canada Ltd., which is a local industry. As mementoes, each participant received a flight-box plaque and a special pin, which showed the Jet Rally logo.

Judging by the enthusiastic response of pilots and spectators, it's a safe bet that there will be a Quinte '90 Jet Rally. We'll let you know the date as soon as we've decided it. Hope to see you there under a calm, cloudless sky.

1989

BAY OF QUINTE FAN JET RALLY

was a truly memorable model, and he flew it well.

John Carlson of Minneapolis, MN, brought several unique jets in various stages of completion. Several years ago, I met John at a Byron Fan Rally where he displayed a MiG-21. John's collection now includes a beautiful Saab JAS39 Gripen and a Temco TT-1 Pinto (a rare U.S. Navy jet trainer of the late '50s). John's most impressive display was a huge "plug" for a MiG-29 Fulcrum, which is sized to use twin Byron Fans. When the Fulcrum is completed, he'll have a 35-pound airframe that will be a real show-stopper.

Back at the flight line, Bruce Sanders of Century Jet

Jim Werst of Mertztown, PA, with a Sterner Engineering P80 powered by a Rossi .81 Byrojet combination.

Models was putting on an impressive display with his T-45 Goshawk. This model, like the Yellow F-16 and Jet Model Products' Starfire II, seemed unaffected by the wind.

My highlight of the day was seeing Charlie Lines of Rome, NY. Charlie is a pilot with U.S. Air, and he's currently building a Learjet 35A. He brought his Learjet airframe, which was in primer. I was extremely impressed! He also brought the A3J-1 Vigilante that I built in 1982 and sold in 1986. The model now has a new engine and radio, and it looks better than the day it left my shop. The "Viggie" is proof that jet model airframes can have extremely long, useful lives.

Sunday was sunny, but the wind was still ferocious. The windsock at Mountain View was standing at rigid attention,

Charlie Lines of Rome, NY, with a Learjet 35 in primer. Charlie expects to fly this model in the fall of '89.

but the local optimists were assuring everyone that conditions would calm by noon. Hoping they were right, I rushed to the transmitter impound to reserve flight times for early afternoon.

By 11 a.m., the Yellow Aircraft Group decided to launch three of its twins. Bob Fiorenze and Bill Harris each flew an F-15, while Dennis Crooks flew an F-14. Dennis is probably one of the most proficient scale fliers in North America; his mastery of the F-14 is astonishing. He's smooth and confident, and he never fails to display the Tomcat's full potential.

Mark Frankel's Lear 35A created a lot of interest, as can be seen from the crowd. Large model reportedly handles "like a pussycat."

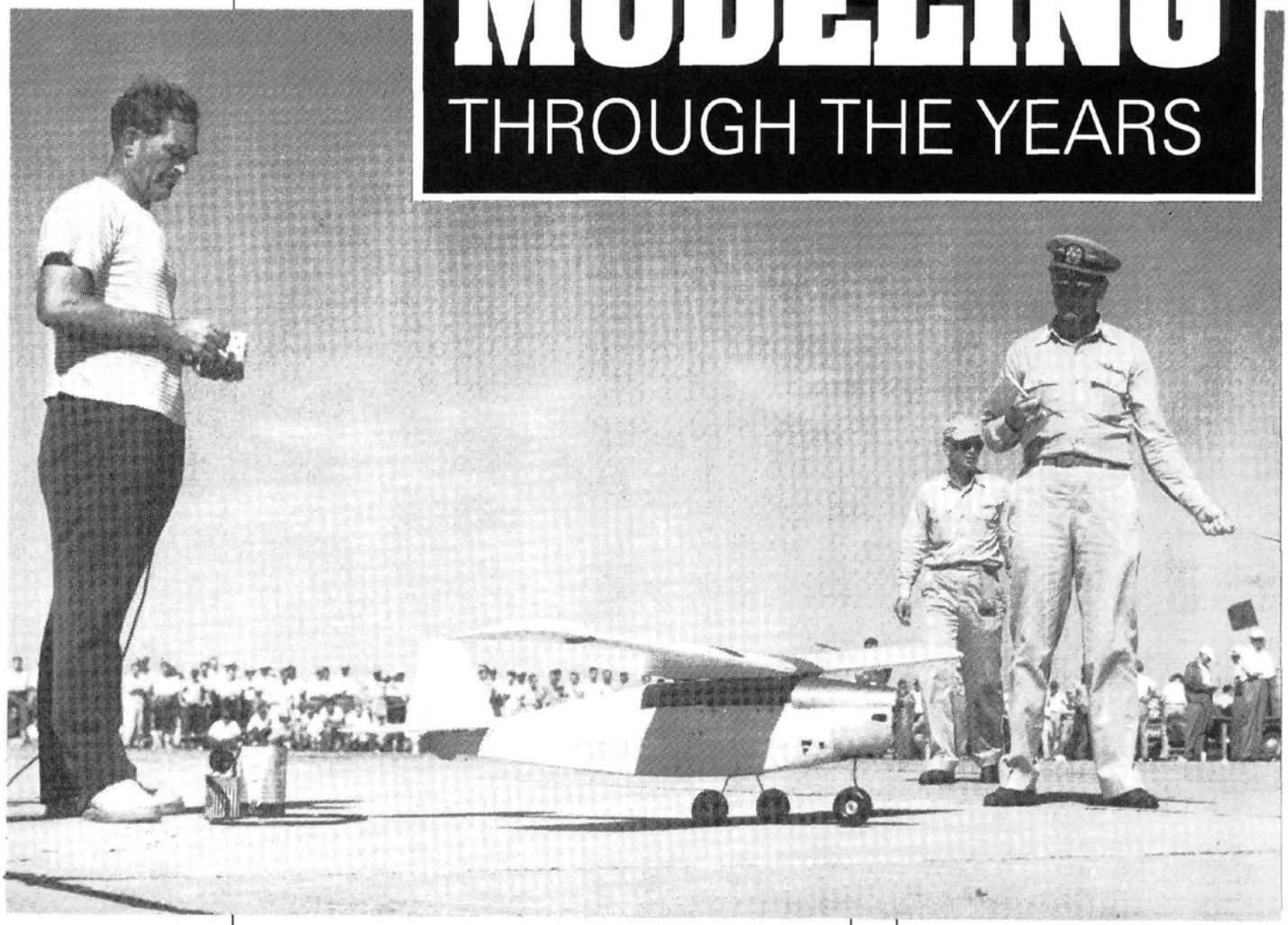
I was so impressed with Dennis' performance in the wind that I asked him to demonstrate my Learjet. Until then, the Lear had never been flown in high winds, and I didn't know what to expect. Although the conditions were truly intimidating, I really wanted to display the model to this crowd. Dennis put on a very impressive flight; he handled the Learjet better in the wind than I can in dead air.

Art Arro, a well-known Formula I pilot from Rome, NY, brought a 10-year-old A-4 Skyhawk from the original Violett kit. Art's model is powered with a Turbax I fan and

(Continued on page 102)

AERO-MODELING THROUGH THE YEARS

by HAL DeBOLT



The U.S. Navy's cooperation over the years has done much to promote our Nats meets. Here, "Mr. U-Control," the fabulous Jim Walker, begins a flight at the 1950 Nationals.

JUST AROUND THE TIME WHEN MODEL AIRPLANE NEWS FIRST HIT THE NEWSSTANDS and started to delight aircraft enthusiasts with its coverage of full-size planes and models, my interest in the hobby began. While the magazine reported on global happenings, I saw everything from a modeler's point of view. Now it's *MAN's* 60th birthday; we've traveled together and seen the hobby grow from just a few activists to the *millions* of members claimed by AMA today!

To say that modeling originated in 1929 would be incorrect, because we know that so-called "models" were flown in the 1800s, long before the Wright Brothers flew. In fact, a fellow called Stringfellow demonstrated flying models in London's Crystal Palace in 1885, and the excitement they caused was as great as the elation *we* felt when "Sputnik" first orbited the earth in October 1957—*thirty* years ago!

After the success of the Wright Brothers and the publicity given to aviation during WW I, eager young would-be aviators just *had* to participate, and their limited resources led them to model building. In 1927, Lindbergh's solo flight across the Atlantic focused the attention of the world on one small plane. During his *33-hour* ordeal, a palpable tension gripped the entire U.S. as we hopefully awaited his triumphant landing in Paris!

Since then, model aviation has never looked back! WW I and WW II caused a phenomenal investment in aircraft development, and as full-scale aviation expanded, so did public interest in it, and model aviation received its share of this popular enthusiasm. As a result, magazines like *Popular Aviation* and *Aero Digest* flourished. Occasionally, they offered a brief description of someone's model, and that was enough to

A Nostalgic Look Back

get many of us started. The hobby grew steadily, but since we lacked knowledge and good reference material, there were *many* frustrations. Fortunately, along came *Model Airplane News*, and, right from the first issue, it met many of our needs. After that, there was nothing to hold us back! The details seem even more amazing now than they did then!

Today, no matter which plane is chosen, new modelers have comparatively few problems when they start modeling. With magazine info and construction articles and readily available kits (even ARFs), we no longer have to come up with our own designs or even search for supplies. We simply follow instructions and assemble the pieces provided. After that, more instruction (and, frequently, wise words from an experienced helper) gets us flying—more or less? T'wasn't so in 1929!

In that era, as a lone modeler, you eagerly waited for *MAN* to arrive and, when it did, you rapturously devoured the information contained on every page. (Some things *never* change!) In that way, you gleaned ideas and decided what you'd attempt to make; your wish list *always* lengthened faster than your list of accomplishments (another thing that hasn't changed!). The need to make certain decisions just hadn't arisen then: There was no need to consider which engine or radio to use, or even to decide whether to fly control-line orR/C; you had only *one* choice—rubber-powered free flight!

Phil Kraft in the '70s with a modern-day-style pattern R/C. As an R/C manufacturer, Phil did much to keep the sky full of R/C planes, many controlled with his "gold boxes."

We still had a long way to go! While we were then able to find ideas that developed into projects, we still had to learn modeling *techniques*. The hows and whys of building were serious concerns, as was aerodynamics, which we *had* to know more about if our models were ever to fly well. Why did one model stay intact and fly while another didn't? What was wrong with the unsuccessful one? In reality, there was still a great deal to learn about basic aviation.

MAN's first editor was a modeler and expert in aerodynamics. Charles Hampson Grant quickly recognized our need for technical information, and a monthly column on aerodynamics was soon introduced and proved to be most popular. With time, a readers' questions portion was added, and this was very helpful. Something wrong with your model? The place to go for help was Charlie's column, and, more often than

The U.S. team at the first R/C World Championships (1960) in Zurich, Switzerland. From left: Champ Kazmirski, deBolt and Dunham. Note this was the first step toward modern R/C, and all contributed extensively.

Walter and Bill Good's "Big Guff" R/C model demonstrated the ability of R/C years before the R/C explosion of 1952.

not, the answer would be in the next issue. Today, we turn to Clarence Lee and Joe Wagner with our engine problems; they help us all.

Charlie Grant was mentor to most modeling pioneers, and to say that today's model designing originated with his "Model Airplane Design and Theory of Flight" is the understatement of the decade!; we all considered the book to be our Bible! Through his knowledge and work, many obstacles to successful modeling were removed, and with success came an even more rapid growth in the hobby. Charlie gave so much to early modelers.

Frank Zaic also did much to improve modeling in many ways, and we all owe him our gratitude. He was an accomplished modeler who gained modeling friends all over the world. He shared his knowledge globally, but the knowledge was thinly spread far and wide. To resolve this problem, Frank asked his friends what they knew and then compiled the information in what he called a "Year Book," for which he took the time to make accurate sketches of models and gadgets. You have to see one of the Year Books to believe it! Loaded with helpful info and sketches, they averaged 200 pages with no BS anywhere! Frank went on to produce other valuable, but more specialized, books on design and construction, and his contribution has helped us all along the path to success.

As well as disseminating information, Frank Zaic realized that something else was missing: In those days, there were no model shops! Modeling needs are specialized; you won't find everything you want at the hardware store or lumber yard, so, headed by Frank's brother John, the Zaic family formed the Junior Aeronautical Supply, which produced a catalog and sold hobby supplies by mail. If you lived in New York City, however, you could stop by and see them. You could include questions with your order, and along with the merchandise, came the answers! Modern mail-order houses can't compare; as well as providing the materials we needed, the Zaics made modeling easier and more rewarding for us all.

A sign of the growing popularity of model aviation was the appearance of modeling supplies in hardware and department stores. We were making an impact, and these people recognized the commercial opportunities. Hardware stores began to stock a few "solid model" kits and perhaps some Comet rubber-powered models. In major cities, some department stores added a model department where you could buy supplies and, with instruction, often even *build* your models. From this beginning, some of the first outstanding model clubs emerged, and the public was made increasingly aware of the hobby.

Modelers' Merger

With growth came the need for a *national* organization, and since, at that time, the public was enthusiastic about anything to do with aviation, doors were easy to open. We all know how great AMA has become, but how did it get started?

With its national circulation, *MAN* reached most modelers, and the staff was fortunately in tune with what we needed (and our needs seemed endless!); and (probably through reader input) they realized that some form of national organization was essential. This was the time of the first gas engines, and *MAN* announced the organization of the "International Gas Model Association." The response was overwhelming, and the Association soon had thousands of members. It became apparent, however, that catering to the needs and objectives of such an organization went far beyond the ability of any magazine. The details of the solution are far too complicated for this article, but, using the IGMA as a nucleus, in cooperation with the National Aeronautical Association, the AMA was formed. Much credit should be given to the energetic Al Lewis, who led the AMA through the formative years.

Since its beginning, the AMA has been just what we needed. First, it drew us all together and has acted as a link between us and the rest of the world, giving us the exposure we needed to grow rapidly. Second, it provided the impetus to the development of other associations, which all came about through the activities of AMA. Of course, today, AMA is a Goliath of 150,000 members.

Past Personal

Let's look at my situation in the early days to see how one organization led me and so many others onward and upward. At the time, with the help of *MAN* and the Zaics, I was slowly learning the hows of FF rubber power. During the winters, most of us modeled with "solid scale" subjects, which were "big" at that time, but *flying* models were our *real* interest. Unless you lived in a major city

with organized clubs, progress was agonizingly slow (it seems today), but each new accomplishment was a great thrill!

By the '30s, the Hearst newspapers were nationally distributed and the organization was very progressive. Hearst apparently realized the impact model aviation was making and he formed a national organization called "Junior Birdmen," which was given national exposure in his 17 newspapers. The Junior Birdmen operation provided basic local communication and activities.

Local Birdmen divisions were operated by "newspaper people," so no real modeling help came from them, but they did publish weekly "columns" on model aviation in which modelers could present ideas and read about happenings. Those weekly editions were eagerly awaited!

The greatest contribution of the Hearst organization was the competition that the Jr. Birdmen provided. For the first time, we had professionally organized and conducted *local* meets, and location was important, because this was the Great Depression, and if you didn't live close to a major city where the better meets were held, you couldn't get to them. The Jr. Birdmen held two meets each year and some "specials," e.g., exhibition scale.

In the summer, they staged an outdoor event for rubber-powered planes, and in the winter, an indoor meet—again, for rubber classes. It was obvious that the Birdmen collaborated closely with the AMA, as all meets were conducted according to AMA rules.

As meets go, the Jr. Birdmen events could be considered good. They were well attended, had the best facilities and were conducted well. Prizes at the regional level weren't large: perhaps a small trophy for a 1st and ribbons for the others who placed. Each meet did, however, have a Grand Champion who received a distinctive trophy.

Best of all, the Jr. Birdmen had two *national* meets (one outdoor and another indoor) that could be compared with today's "Tournament of Cham-

(Continued on page 102)

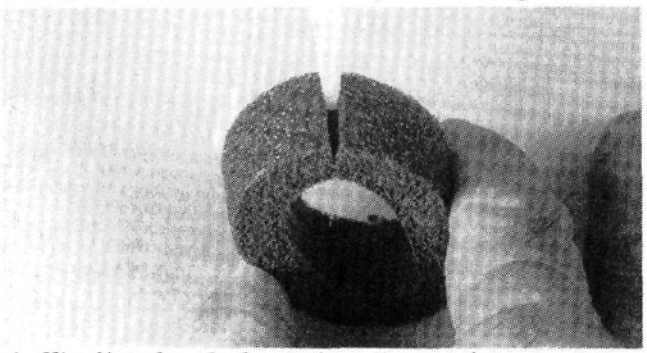
How To:

by RANDY RANDOLPH

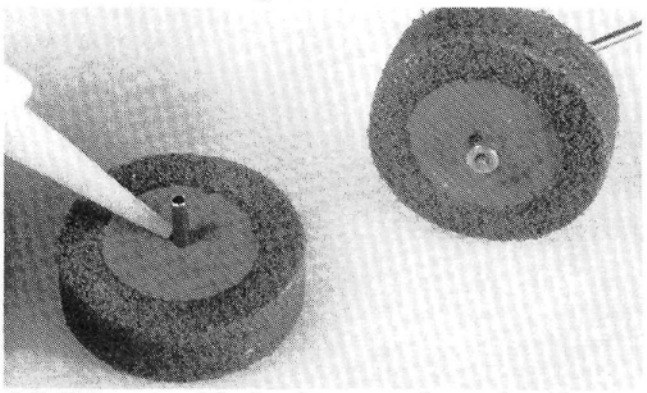
MAKE SOFT, LIGHT WHEELS

Weight-saving measures have always been a priority in aircraft engineering and construction, regardless of the size of the airplane, and model aircraft respond to weight reduction even more than their full-scale counterparts. The photos show how to make lightweight, shock-absorbing wheels that can replace heavier 2-inch wheels, in most applications.

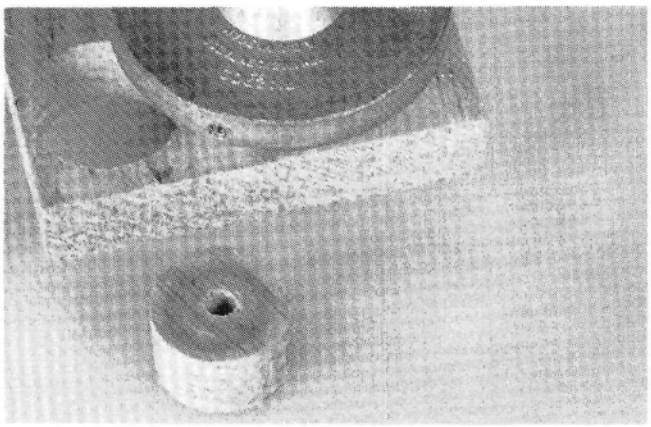
1. *Tools and materials required are a 1 1/2-inch hole saw, a 3/4-inch pine board, a length of 1 1/4-inch i.d. water-pipe insulation, a length of 1/4-inch dowel, a razor knife and instant glue.*



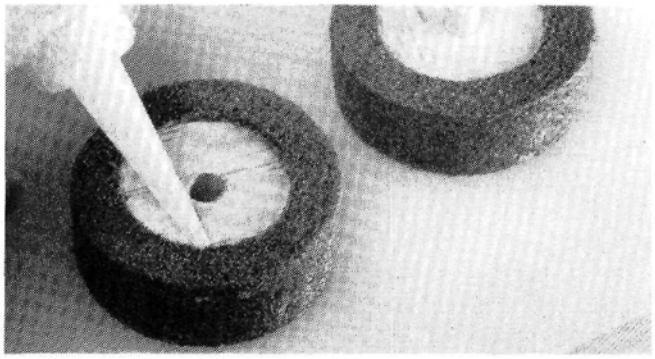
3. *Slice 3/4-inch-wide donuts from the water-pipe insulation. Squeeze each donut so that the slit in the insulation opens, and apply instant cement to the slit. Allow the slit to close, and hold it closed until the glue cures.*



5. *Drill the center of the dowel to accept a brass tube with an inside diameter the same as the intended axle size—in this case, a 1/8-inch tube for a 3/32-inch axle. Wick instant glue into the tube hub joint, and trim the tube flush with the hub.*



2. *The 1 1/2-inch hole saw should produce a core that's about 1 1/4 inches in diameter with a 1/4-inch hole in the center; this will form the hub of the wheel. Saw one hub for each wheel.*



4. *Insert the pine hub in the foam donut tire, and wick instant glue into the hub/tire joint. Insert a length of 1/4-inch dowel into the hole in the center of each hub, and apply cement in the same manner. Sand the dowel flush with the hub.*

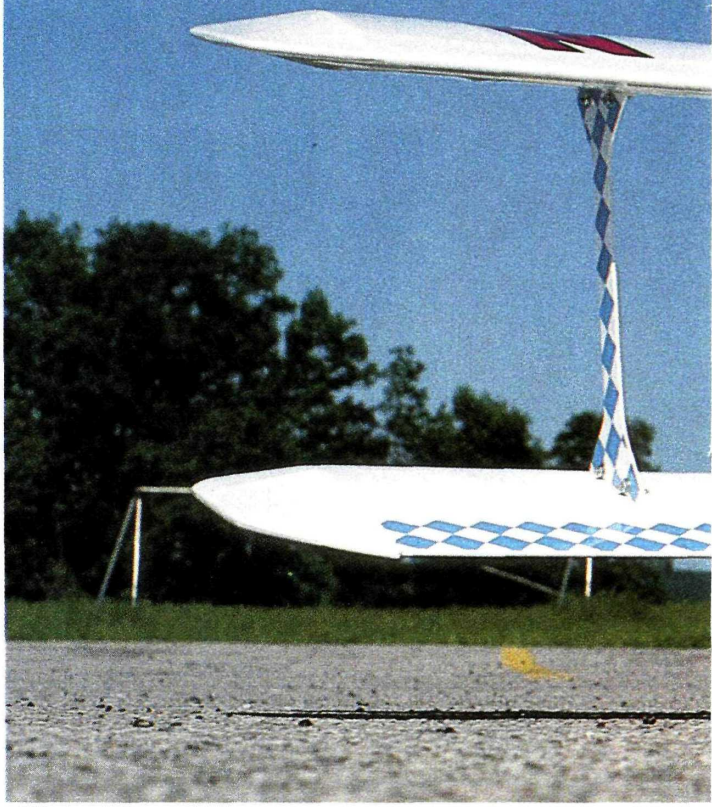
6. *The completed wheels are very lightweight and they don't bounce. Like radial tires, they'll take a set if allowed to rest on a hard surface, but they resume their shape as soon as they're used.*

Message painted on the cowl expresses widespread viewpoint: "4 Strokin'...the ONLY way to fly!"

SPECIFICATIONS

Type: *Sport biplane*
Wingspan: *48 to 52 inches (builder option, see text)*
Weight: *7 3/4 pounds (124 ounces)*
Wing Area: *817 to 910 square inches*
Wing Loading: *19 to 21 ounces per square foot*
Power Req'd: *.45 to .61 2-stroke; .90 to 1.2 4-stroke*
No. of Channels Req'd: *4*
Suggested Retail Price: *$124.95*
Features: *All balsa construction, ABS cowl and wheel pants, photo-illustrated construction book.*
Comments: *An updated version of a classic kit design. Builds easier and incorporates modifications to use 4-stroke engines. Great aerobatic bipe.*

The Aeromaster on its maiden hop. Initially sluggish, new O.S. turned it into a tiger!



PHOTOS BY CHRIS ABATE

by CHRIS ABATE

THIS FIELD AND BENCH Review was like a blast from the past, because I built my first Aeromaster back in '72. Here I am with another one.

The Aeromaster was originally designed by Lou Andrews, who, at the time, owned AAMCO, Inc. Great Planes Model Manufacturing Co.* bought his design, updated it, and has now made it available again. Although there have been a few design changes, the Aeromaster still looks great. Wheel pants and an engine cowl have been added, and, yes, its flight characteristics are the same.

All the components are nicely packed, and small parts, such as wood and hardware, are individually packaged. The hardware package contains all items necessary to complete assembly, including a motor mount for a .60 2-stroke engine. The larger balsa parts are bundled together with rubber bands, and there are a number of die-cut balsa and ply sheets.

The die-cutting and wood quality were good, except for the stab fairing pieces, which were of very hard balsa and didn't bend very easily, even after being soaked in a solution of 50-percent water and 50-percent ammonia. I finally decided to cut new parts from softer balsa. The forward section of the cowl and wheel-pant halves are of ABS molded plastic, as is the canopy, which, of course, is transparent. Two plan sheets and a 46-page instruction booklet are supplied, along with a photo page containing 83 photos numbered sequentially. To help identify the part numbers, the instruction booklet also has drawings of all the die-cut sheets. There are no decals in the kit.

CONSTRUCTION: The tail surfaces are of pre-cut 1/4-inch balsa sheet. The stab is made of two sheets and the vertical fin of three sheets. The split elevator and rudder are one piece with tip pieces that are glued to them, as are the stab and vertical fin. Once glued, the grain of the tip pieces will run perpendicular to the main structure to help prevent warping and

GREAT PLANES

SUPER AEROMASTER BIPE

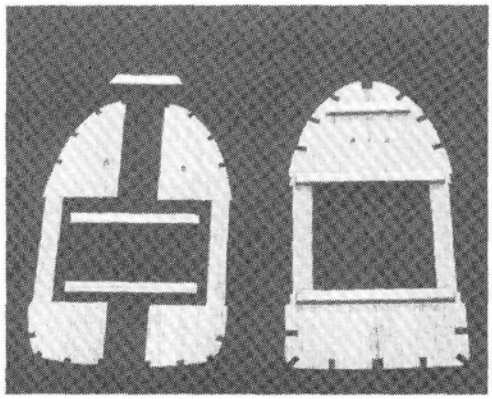
Living proof that some beauties just get better with age

No one can argue with the absolute grace and beauty of a well-proportioned biplane.

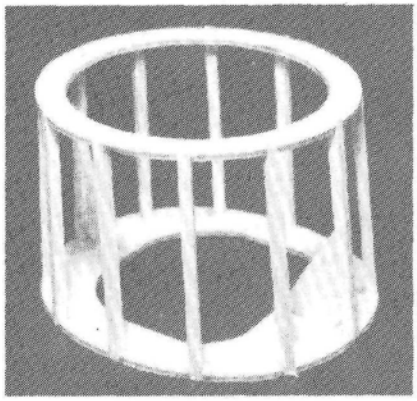
make it easier to sand the tips to shape. The split elevators are joined by a 3/32-inch elevator wire.

Before you start the fuselage, you'll have to decide whether you'll be using a 2-stroke or a 4-stroke engine. The fire-wall position is the same for both, but with the 2-stroke engine, a plywood engine box (parts supplied) must be constructed. (The engine mount is bolted to this.) This will extend the engine's thrust washer out past the cowl and allow for prop clearance.

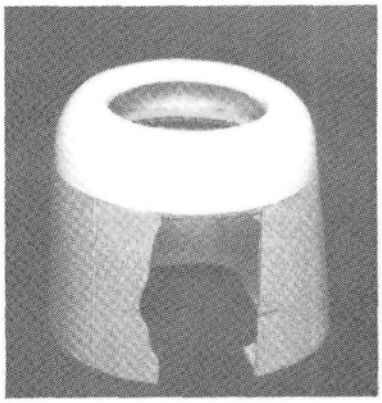
The first step in constructing the



Aft fuselage former halves are joined at their center lines and then reinforced with 1/8x1/4-inch balsa.



Cowl framework awaiting sheeting and ABS cowl ring.



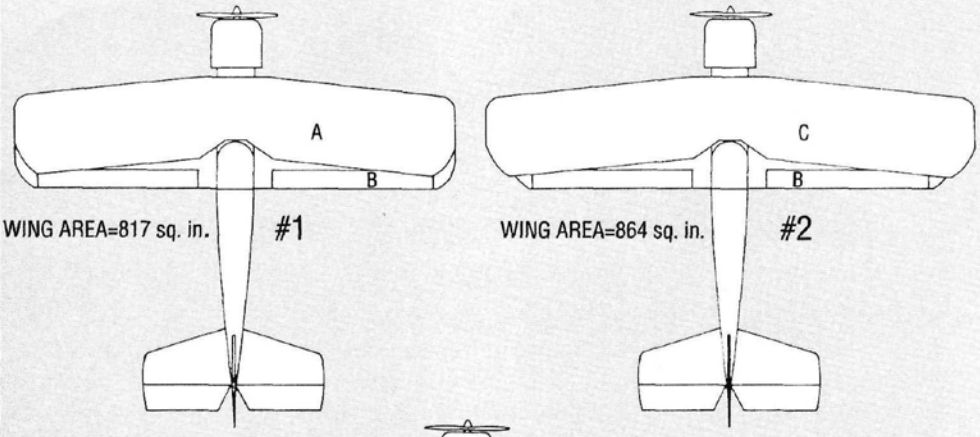
Cowl is built up, fiberglassed and made ready for paint. Note ABS cowl ring.

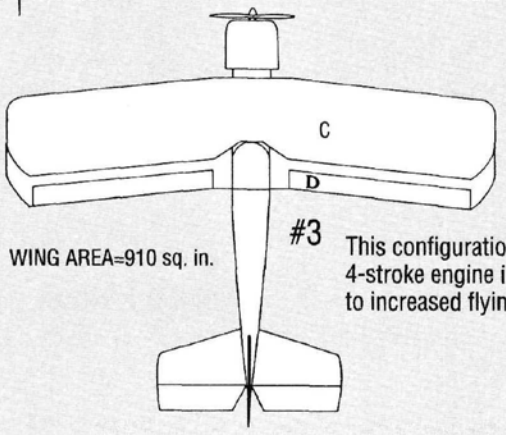
Below: As can be seen, three wing configurations are possible (reprint from the instruction booklet).

WING CONSTRUCTION READ THIS FIRST!

Name	Dihedral	Shape	Span
Top Wing A (short)	no	swept	48"
Bottom Wing B (short)	yes	straight	48"
Top Wing C (long)	no	swept	52 1/2"
Bottom Wing D	no	swept	52 1/2"

The Super Aeromaster can be built with three different configurations. Decide now which one you will build. Configuration #1 has two short wings; configuration #2 has one long and one short wing; and configuration #3 has two long wings. See the information on each wing here to help you decide which wings to build. Flight characteristics are similar, so the choice can be based on the desired wing area and appearance.



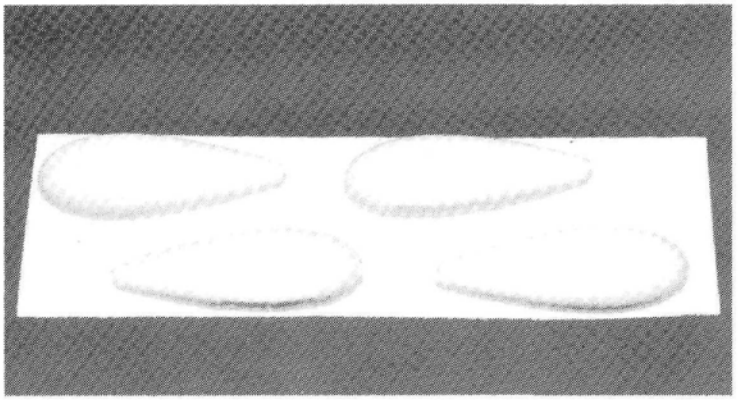


This configuration is suggested for 4-stroke engine installation, owing to increased flying weight.

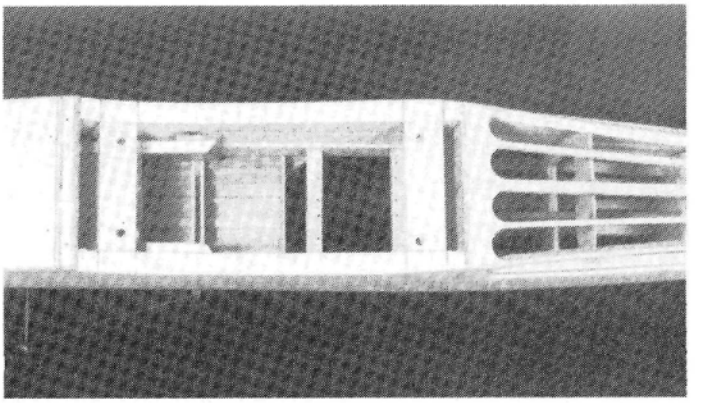
fuselage is to make the five aft fuselage formers. These are die-cut, and each has a left and a right side. They are butt-glued at the center line and reinforced with 1/8x1/4-inch balsa running left to right. All other fuse formers are one piece and die-cut. The main fuselage sides are full-length 3/16-inch pre-cut balsa. To each fuse side, a grooved 5/16-inch "box-lok" piece is glued. This will hold the cabane strut supports, the fire wall and the aft 1/4-inch balsa box-lok ties. (These pieces also act as the fuselage doublers.) Below this, 1/2-inch pre-cut balsa wing-bed pieces are glued. To ensure that the fuselage is square, the fire wall fits into the forward groove and the aft box-lok ties fit into the aft groove. After this is completed, the rear formers are slipped into place and glued to the fuse side. Two 1/8-inch pre-bent wire cabanes are then fitted into the cabane support blocks inside the fuselage. The six forward fuselage formers are glued into place.

The top forward fuselage is covered with 3/32-inch balsa, which is die-cut to shape. The remainder of the fuselage is an open structure with 1/8x1/4-inch and 1/4x1/4-inch balsa stringers, top and bottom. The forward bottom part of the fuselage is made of a 3/8-inch plywood main landing-gear plate and 3/8-inch balsa sheet. The plywood landing-gear plate is grooved to accept the wire landing gear.

The cowl comes next and is made of forward and aft bulkheads, which are die-cut ply with stringers of 3/32-inch balsa run between and 1/8-inch balsa sheeting covering. A supplied, vacuum-formed, ABS plastic cowl ring is glued to the front. This struc-



Wheel pants are vacuum-formed ABS plastic, as is the cowl ring.



Strong box-loc system can be seen; plenty of room for radio system.

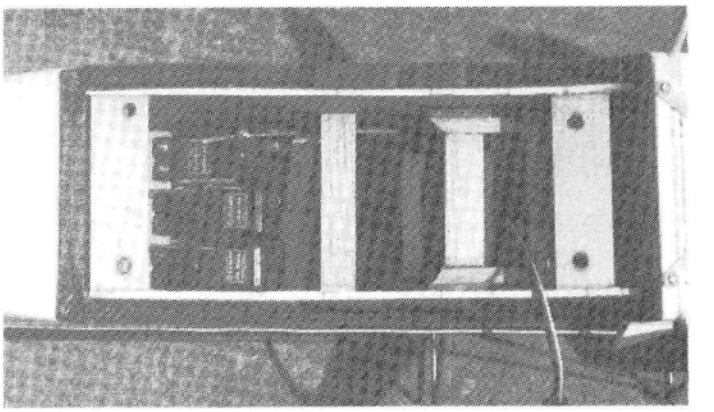
ture is then covered with 3/4-ounce fiberglass cloth that overlapps the plastic front piece by approximately 1/8 inch. The cowl is held to the front of the fuse by four 6-32 bolts and blind-nuts.

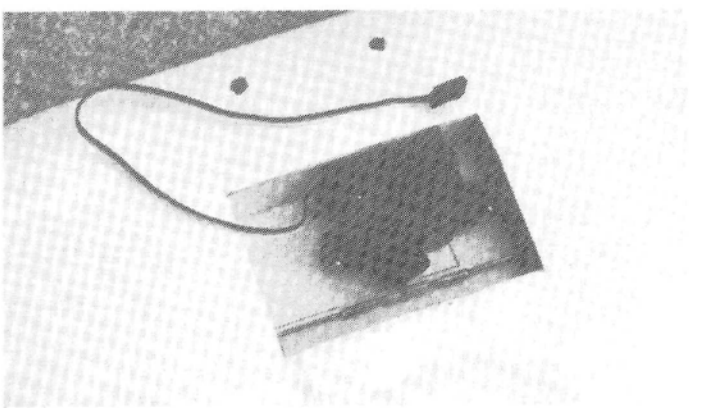
The main landing-gear assembly can be set up for use on grass fields or paved runways. If operation off grass is planned, the gear can be raked forward to help prevent nose-over. Naturally, this grass-field setup can also be used on paved surfaces. The main gear is made of 5/32-inch and 1/8-inch pre-bent wires, which must be silver-soldered together at the axle line. Soft wire is provided for wrapping. Care exercised during soldering produces a very strong setup that can withstand even Frank Tiano's landings!

The wheel pants are vacuum-formed ABS plastic molded in halves. All you have to do is trim off the sheet. Glue the halves together, cut out the wheel openings, drill the hole for the axle and you're done, except for the finishing, which I'll discuss later.

The wings are next and, yes, there are two. There are three wing configurations with wing areas that range from 817 square inches to 910 square inches and from both wings swept to bottom straight and top swept. The span of the wings also ranges from 48 to 52 1/2 inches. The choice is yours, but for 4-stroke operation, No. 3 is suggested; this is 52 1/2 inches long and yields 910 square inches. This choice will aid in offsetting the additional flying weight of the 4-stroke engines. Both wings, in any configuration, are built similarly. The airfoil is almost fully symmetrical, so make sure you can identify the tops and bottoms of the ribs. The method I use for identification is to stack all the ribs together, place them upright on the workbench and run a line across the top of them with a marker. Don't worry about the marker line showing; it will be covered by either sheeting or capstrips. Both wings have an open structure, which means they aren't fully sheeted. The leading edges of the wings are of preshaped balsa, which helps when it comes to final sanding. The bottom wing differs from the top wing in that it has the ailerons and a servo well. The top wings contain two grooved hardwood blocks in the bottom center section into which the cabane wires slip, and they're retained with metal straps and nylon bolts. This makes a very neat, clean upper-wing attachment. The hardwood blocks supplied in my kit were the *wrong* size, and the instructions on page 19 that called for 5/8-inch grooved cabane wire blocks were also wrong; they should be 3/4 inch. I phoned Great Planes, and they sent me the correct parts.

Attachment points are shown on the plans for the outer wing (interplane) struts, which are optional. Since the wings are fully shear-webbed on both leading- and trailing-edge spars, the struts

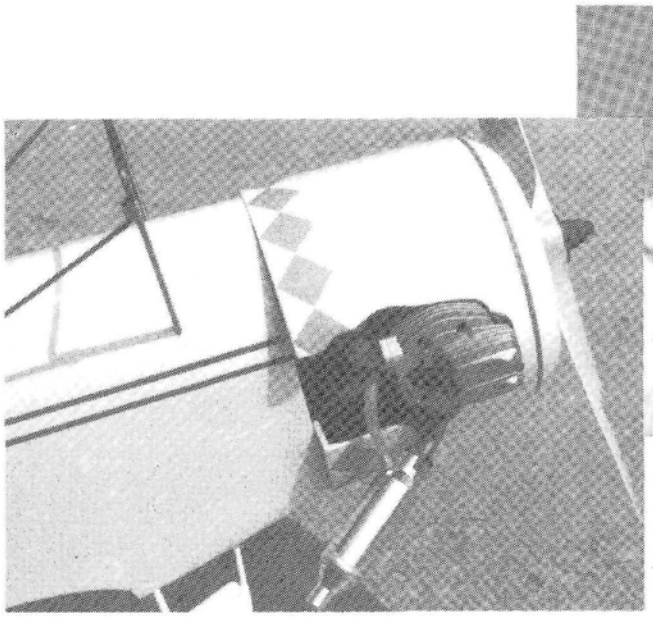




Lower wing houses aileron servo; the ailerons are on bottom wing only.

aren't needed, but they do enhance the appearance of the model. The instructions show an option for the struts, utilizing streamlined tubing and other assorted hardware. A trip to the local hobby shop to buy the items needed would have cost me approximately $21. I took a different approach: I made them of 1/8-inch lite-ply and attached them to the wings with right-angle nylon brackets (No. 278 from Carl Goldberg*).

After construction is complete, it's time to choose the finish. I elected to use Super MonoKote*. Make sure all the wood is sanded to a smooth finish. I started with 150 grit, then used 220 grit, and the last sanding was with 400 grit. The cowl and wheel pants were primed and wet-sanded, then a color coat of white



Reworked Williams Bros. pilot figure gains realism through addition of headset, boom mike and sunglasses.

Left: The O.S. 91 Surpass 4-stroker is a natural for the Aeromaster.

Cheveron* paint was applied. The match to the MonoKote was perfect. All numbers and letters are of trim MonoKote, and so are all the little blue 3/4-inch squares. The black lettering on the cowl was done with a permanent marker covered with a coat of clear Cheveron.

Radio installation shouldn't be a problem; there's plenty of room. I use the new Futaba* 5-channel 1024. Four-channels are all that's needed to operate the Super Aeromaster. Follow the radio installation as shown on the plans; it works out very nicely.

PERFORMANCE: The engine chosen was the old version of the O.S.* .90 4-stroke. Swinging a 12x6 prop, it did little more than pull the Aeromaster around the circuit. The engine has seen extensive use and is very tired. Even though the bird weighed only 7.5 pounds, the engine just didn't do the job. So out it came, and in went an O.S. .91 Surpass 4-stroke swinging a 12x10 Zinger* cut down from a 13x10. I stopped tweaking the needle at 9900rpm, and the difference was remarkable. The .91 gave more than adequate power: vertically, horizontally or any other position. Flight trim required was a touch of up and left. Ground handling is very positive.

A word of caution: Since the engine is mounted with 0-degree side thrust, watch the quick advancement to high throttle. The torque of the engine will be apparent, both on the ground and in the air. Just remember to apply power slowly and feed in right rudder. If you want to add right thrust to the motor setup, the suggested amount is 2 degrees, and this is spelled out in the instructions. The Super Aeromaster is very aerobatic and will do it *all*. It responds to commands quickly and positively, so I don't recommend it for beginners. It is, however, very docile on final. Don't be worried about slowing it up and tip-stalling; it will hold its own.

Everything about the Aeromaster is straightforward, even though there are two wings to build. I made no modifications to the design, and the instructions were clear. It will probably take the average builder three weeks of nighttime building to reach the covering stage. Approximate retail cost of the Super Aeromaster, minus radio and with an O.S. Surpass .91 4-stroke and all other material, is $600. I enjoyed building the Aeromaster; I'm sure you will, too.

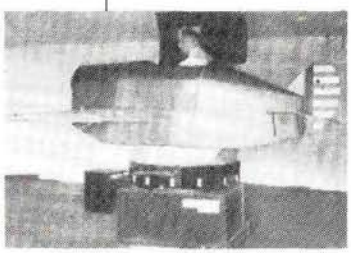
**Here are the addresses of the companies mentioned in this article:*
***Great Planes Model Mfg.**, P.O. Box 788, Urbana, IL 61801.*
***Carl Goldberg Models Inc.**, 4734 West Chicago Ave., Chicago, IL 60651.*
***MonoKote;** distributed by Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.*
***Cheveron Hobby Products,** P.O. Box 2480, Sandusky, IL 44870.*
***Futaba Corp. of America,** 4 Studebaker, Irvine, CA 92718.*
***O.S. Engines**; Distributed by Great Planes Model Dist. Co., P.O. Box 4021, Champaign, IL 61820.*
***Zinger;** distributed by J&Z Products, 25029 S. Vermont Ave., Harbor City, CA 90710.* ■

Evolution moves slowly towards perfection...

THE AEROMASTER DESIGN has been around for more than 20 years, and you can bet that very many of them have been flown during this time. It has long been a favorite of the hot-dog biplane lover. I'm sure that some were even bought and built with the intention of using them as a beginner's airplane—just ask me! As you can see by the photo, old meets new. Just as is the case with the Great Lakes and Wacos, the date of manufacture may be brand new, but the looks, charm and performance are *classic*.

Some things just keep getting better! ■

60 YEARS OF MODEL AIRPLANE NEWS



One of the early Link trainers: the fledgling birdman's introduction to flight.

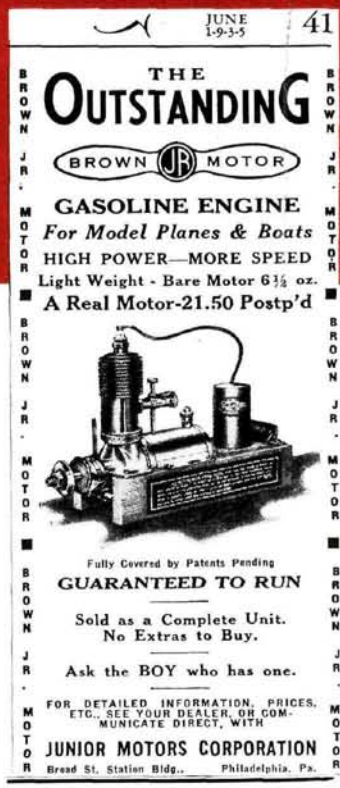
Recap with us 60 years of MODELS, 60 years of AIRPLANES, and 60 years of NEWS..... a whirlwind tour of our history!!

by RICH URAVITCH

1929

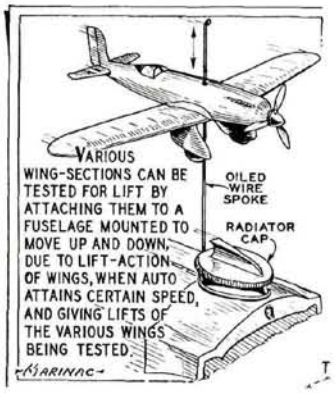
During its first year, *MAN* was called *"Universal Model Airplane News."* The cover price was 15 cents, and it showed the aviation community the first example of what was to become standard equipment in the world of flight training: Edward Albert Link sold the first of a long line of stationary trainers that would bear his name. These were the forerunners of today's sophisticated simulation systems.

60 YEARS OF MODEL AIRPLANE NEWS



1933

"A Course in Aviation for 15 Cents A Month" was the subhead to our title then. We had a regular feature called "Model Kinx," in which J.G. Marinac presented sketches of handy modeling ideas—not unlike our own Jim Newman does today. The Aviation Advisory Board, chaired by Editor Charles Hampson Grant, was by now a regular, and extremely popular, monthly column. It contained responses to readers' questions and covered a broad range of aviation subjects. The first Navy aircraft to have a retractable landing gear—the Grumman FF-1—entered service in this year. *MAN* presented construction articles, with plans, for some unique model designs, including a pivot-wing flying model and a rubber-powered, tail-less pusher canard. Remember, this was in 1933!



Carl Goldberg at a youthful 22.

1935

Events of this year had far-reaching implications that no one had even considered. With its fully enclosed cockpit and retractable landing gear, the prototype Messerschmitt Bf-109V-1 made its first flight in September. Ironically (in light of what would follow), it was powered by a 695hp *British* Rolls Royce Kestrel engine. On the modeling scene, Robert Morrison (later of Morrison Repla-Tech) used the pages of *MAN* to report on the 1934 National Air Races, where he observed what we now consider to be the "Golden Age" racers like the Wedell Williams special, Art Chester's "Jeep" and Steve Wittman's "Oshkosh." The AMA was just one year old, and *MAN's* "Model Builders' Hall of Fame" saluted a 22-year-old Carl Goldberg and concluded its recap of his life to that point by recognizing him as "one of the cleanest enthusiasts in the cleanest sport we know of."

A bit over $16,000, brand new, in 1940! A nice one today will bring five times that much!

1939

The first flight by a turbojet-powered aircraft—a Heinkel He-178—took place in August with the Nation's (and *MAN's*) emphasis shifting to warplanes. Swastikas abounded when Robert McLarren reported in "War Wings Over Europe" that "every prediction made in the past five years of the horror and devastation of the coming war in the air appears likely to come true before the holocaust has spent its ghastly course." Issues of *MAN* that year and in 1940 featured full-size drawings of popular scale planes like Earl Stahl's rubber-powered Rearwin Speedster and "unique" designs like a FLY-powered microfilm model! Howard McEntee presented a series of articles on the "Elements of R/C," while we reported that the prices for brand-new AT-6s, PT-17 Stearmans and P-38 Lightnings were $16,193, $6,059 and $73,850 respectively! In the meantime, on both sides of the ocean, the war machine was building, and in June, the Focke-Wulf FW-190 made its first flight.

Polk's was daring—even 50 years ago. For a deposit of one buck, they'd ship a new "Sky Chief" engine to you, and 25 cents a week would pay it off! No Visa or Mastercard interest rates, either!

60 YEARS OF MODEL AIRPLANE NEWS

Right: Here's one we tried to talk Chris "4-Stroke Forum" Abate into testing. Even 45 years ago, engines with valves were frequently and, as our readers have pointed out, erroneously, called "4-cycle."

1941-1944

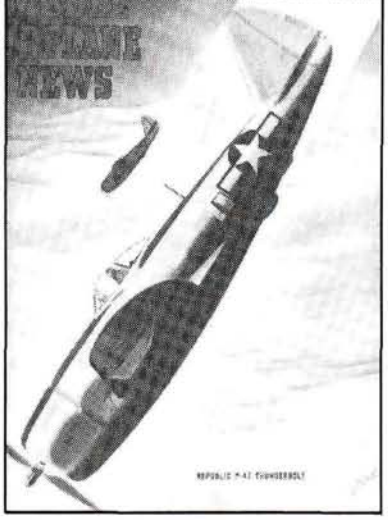
This period was one of intense activity and heightened levels of patriotism. Nearly everyone was either directly or peripherally involved in America's war effort. Full-scale aviation activities were at a fever pitch, and in May '41, the first British jet airplane, the Gloster/Whittle E28/39 was airborne for the first time.

This event was followed by a string of "firsts." The P-51 Mustang first entered service with the R.A.F. in November '41. (Remember that the Mustang, in its original form, was developed in response to a British requirement!)

The prototype Grumman Hellcat first flew in June '42, and it gave a performance that was nearly overshadowed by the first flight, in October of that year, of America's first jet, the Bell XP-59 Aracomet.

Keeping pace with all this activity was critical, and Germany responded by designing, developing, building and flying a jet of its own (the Heinkel He-162 Salamander) in the incredible time of 69 days! Today, it might take that long to get all the contract papers signed! Did you know that the order for the two behemoth prototypes of the Convair B-36 was placed in 1941?

Model construction articles still centered on solid display models, rubber- and gas-powered free flight, plus some control-line. In a purely experimental state, R/C was talked about, but it was obviously well beyond the means of individual modelers. Still, better methods of controlling free-flight models were sought, and *MAN* presented a pendulum-stabilized FF Noorduyn Norseman as one way to satisfy this requirement. An early attempt at "giant scale" was the 1/3-scale Curtiss P-40 Warhawk built by A.F. Meyer of Orchard Farm, MO. It was shown in the March '44 issue and was called "one of the most amazing models ever built." While it's doubtful that it ever flew, it still represented a worthwhile pioneering effort. (And you thought Ziroli had a lock on giant warbirds!!)



60 YEARS OF MODEL AIRPLANE NEWS

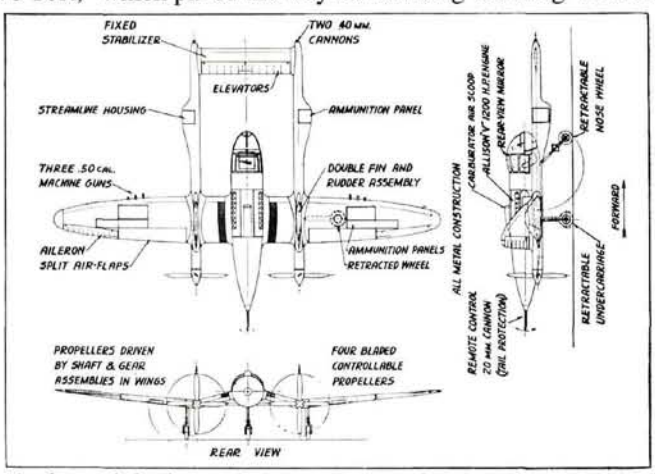
1946-1950

As the previous five years had been filled with the anger and hostility of war, the taste of victory on two fronts moved America energetically toward new aviation frontiers. As shown by the *MAN* covers done by Jo Kotula, the predominantly military themes of the previous years gave way to an entirely new series of civilian and general-aviation aircraft. Howard McEntee was *MAN's* editor back then, and William Wylam (of drawing fame) pitched in as associate editor. Charles H. Grant continued his well-established and widely read "Design Forum" feature, and Willis Nye taught readers the fine art of plane drafting—a talent that allowed him to produce some exceptional scale drawings that are still available. Modeling supplies, like kits, engines and accessories were starting to become plentiful and could even be mail-ordered!

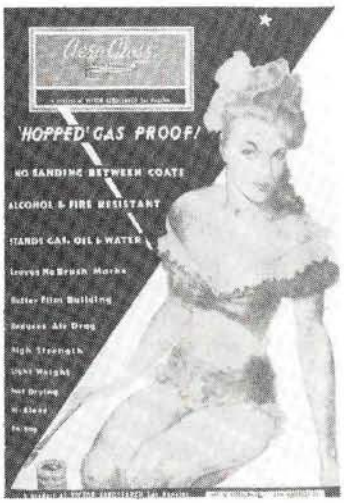
We have evidence of how some good ideas or names have a way of resurfacing, because in the April '46 issue, an ad showed a model called the Duraplane! New manufacturers appeared almost monthly. Names like Comet, Berkeley, Ohlsson and Rice, Herkimer, Testors, America's Hobby Center, Megow, Aristo-Craft and literally dozens of others offered their growing line of wares to our readers. The precursor to today's B-2 stealth bomber—the Northrop XB-35—first flew in June '46, and the following month, Bernard Lynch became the first man to escape from an airborne aircraft by using an ejection seat. In spite of all this activity, the real conquest of the period was accomplished on 14 October '47, when a young Air Force captain by the name of Charles "Chuck" Yeager penetrated that invisible wall of air—*the sound barrier*—in the experimental Bell X-1 called "Glamorous Glennis." Aviation was "on a roll," and there were records to be set and frontiers to be conquered. Mach-busting soon became almost routine, and less than two years after Yeager's historic flight, the Douglas Skyrocket (a research airplane that was destined to set many records in subsequent years) first flew.

Towards the end of this period, Bill Winter came on the scene as *MAN's* new editor, and he brought with him years of modeling involvement that continues to this day. R/C was on the way in, and we saw the establishment of a dedicated frequency band made available for control by radio. *MAN* pioneered the reporting of these early R/C activities and presented a series of articles on equipment. In his article "Radio Control for All," Vern Macnabb commented, "It's here now, and so is the equipment."

Monogram's kits were balsa back then; Guillow's had a line of "shelf" model kits that sold for a whopping 25 cents each; and *MAN* began presenting a series of kit reviews under the banner of "We Test," which paved the way for our long-standing "Field and Bench Reviews."



A plane-of-the-future design contest produced some remarkably unique entries like this canard fighter. Not exactly a Voyager look-alike, but nevertheless ahead of its time.



We wonder how many raised eyebrows and letters to the editor this Pactra Aero-Gloss ad generated when first run in the late '40s?

60 YEARS OF MODEL AIRPLANE NEWS

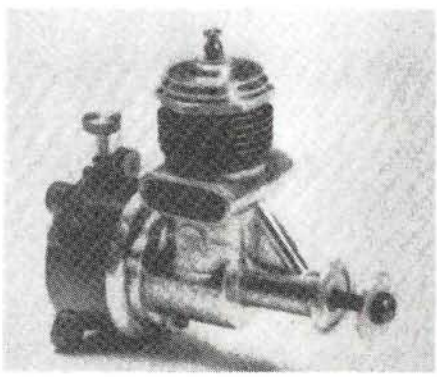
How many of you remember when Duke Fox was involved in the go-kart movement? He still produces some excellent products.

1955-1960

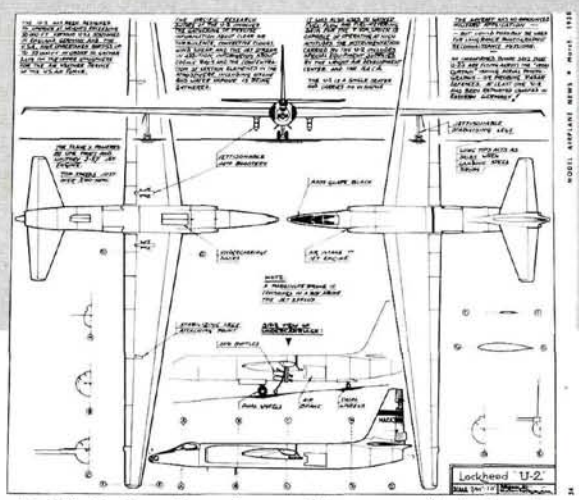
R/C was really evolving during this period. Ed Lorenz wrote a monthly column called "Radio Control News"; ducted-fan-powered models were presented as construction articles with the likes of W.H. Paxton's MiG-15 1/2A free-flight; and Peter Chinn treated us to an article on "How To Cover With Silk." Hal deBolt (Mr. "Golden Age of R/C") designed his 4-pound "Equalizer," which was powered by a K&B .15 and featured a symmetrical wing. The aviation scoop of the decade came, however, when, in the March '58 issue, *MAN* presented a three-view scale drawing of the then *top secret* Lockheed U-2 "spy plane," drawn by Bjorn Karlstrom. The people at *MAN* probably didn't know what they had at the time, but it certainly brought aeromodeling to the media's attention, and the issue received national coverage when the drawing was reprinted hundreds of times in newspapers nationwide.

Ken Willard (yup, the "Sunday Flier" we've come to know and love) explored the possibility of converting a U-Control kit to R/C and told the rest of us how to duplicate the process in an article called "Wireless Stunt." Control-line continued its run of popularity with designs like George Aldrich's Peacemaker and Charles Mackey's Lark, but R/C was coming on even stronger, and *MAN* presented two of the all-time classic R/C designs: the Astro Hog and Ed Kazmirski's Orion.

The full-scale world marveled at the achievement of the British Hawker Siddeley P-1127 with its unique capabilities. Don't recognize the name? How about its later version: the Harrier?! A V/STOL jet had become a reality, and it's now an *operational* reality, serving with both the Royal Navy and the U.S. Marines. Its first hovering flight took place in October 1960.



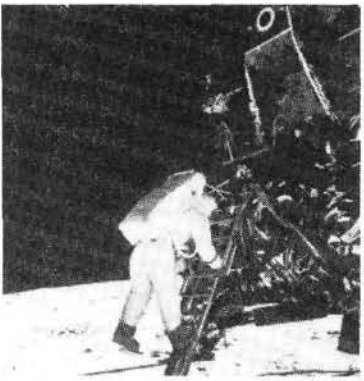
Left: Designed as direct competition for the Cox .020 PeeWee, the O.K.Cub .024 was quite popular, owing to the increasing interest in "small" airplanes.



Model Airplane News "scooped" everyone (including the full-scale-aviation press) when it published this three-view of the then top-secret U-2 in the March '58 issue. Created quite a stir!

Still a serious racing competitor, Dub Jett smiles for the camera at a bygone Nats.

1961-1970



R/C probably experienced its most concentrated growth during this period. Radio reliability was dramatically increased, and the new goals were miniaturization and truly proportional control. The reed-type radio systems, which had been so popular just a few years earlier, were now being made obsolete by the remarkable digital proportional systems that allowed fliers nearly infinite, very precise control.

Operational retractable landing-gear systems were being developed and were beginning to enjoy more widespread use as the interest in scale grew. The '60s was a time for setting records all over the world and in various fields. In 1965, Maynard Hill and former *MAN* Editor Bill Northrop set altitude and distance records within one month of each other.

New materials, some of which were direct results of our country's deep involvement with space programs, contributed immensely to the growth we enjoyed. Integrated circuits and sub-miniature components made small packages where bulk had once been the byword. From a purely modeling standpoint though, the one major breakthrough in materials that overshadowed most others was the introduction of a revolutionary new covering material called MonoKote. It was, and still is, produced by one of the most respected kit companies: Top Flite Models. Applied and shrunk with heat, this remarkable covering reduced the time required to cover and paint a model to a couple of evenings.

Nineteen sixty-six also saw the introduction of an ARF airplane called the Airtrol. It was complete with radio and sold for a reasonable $69.95. Under pressure from its readers to provide more technical/electronics material, *MAN* presented a series on the "*MAN* 2-3-4 Digital System," and this took readers through the fabrication and assembly of an entire digital radio system. Dozens were successfully built and operated. Pattern flying was on the upswing with many of the top-notch designs looking not that much different from those being flown today. (Former Editor Art Schroeder's Eyeball design was typical of the breed.)

Aviation had now merged with space flight, and the term "aerospace" became the banner under which all military machinery was developed. One of the crowning achievements of the century took place during 16-24 July 1969, when Apollo 11, with astronauts Armstrong, Aldrin and Collins aboard, entered lunar orbit, and then Armstrong and Aldrin descended to, and walked on, the moon's surface.

Surely representing one of the earliest commercial efforts at an ARF, this 36-inch-span trainer has all-balsa construction and a "slide-in" engine installation. Radio was included for $69.95!

Aviation has come to this point ... and beyond! The B-1B and SR-71 are now both operational with the U.S.A.F.; in fact, the SR is in the process of being phased out, giving way to strategic reconnaissance satellites.

1970-1979

This was the decade for space exploration, and an incredible number of missions was carried out by both the U.S. and the Soviet Union. Soyuz, Skylab, Apollo and Mariner were the major manned and unmanned projects. Among the closer-to-the-ground happenings were the first flight of the Rockwell B-1 bomber ('74) and the '76 defection of a Soviet pilot to Hokodate, Japan, with his highly classified, operational MiG-25 Foxbat. (The military intelligence community was elated.)

On the subject of intelligence, in the same year, the ultra-secret "recce" hot-rod—Lockheed's SR-71—set a new world speed record (straight line) of 2,193.17mph.

Pattern flying was in full swing, the Tournament of Champions, co-sponsored by *MAN*, was growing both in stature and prize money (and Hanno Prettner is *still* winning that!), and the best pattern designs were published right here. Hanno's Curare and Wolfgang Matt's Atlas were two of the best. A notable accomplishment was recorded in October '75 when Bob and Doris Rich, husband-and-wife team and long-time modelers, flew Liberty Bell, their Carl Goldberg Sr. Falcon, across the country.

Hobie Alter (father of the Hobie Cat sailboat) applied some of his design genius to aeromodeling and produced the Hobie Hawk glider, which was revolutionary in that its wing was preformed with a gradual, curved, upsweep from root to tip; and revolutionary—in the fullest sense—was the appearance of what now represents a fast-growing segment of our sport: the R/C helicopter.

Another major material breakthrough occurred with the introduction to the modeling market of an incredible material with the strange name of cyanoacrylate. This instant-bonding material , which we now call just "CA," tremendously reduced building time, made durable field repairs a reality, and advanced the sport to new levels. Owing, in a large part, to the availability of powerful, relatively lightweight engines, interest in large models was growing. Pioneered by the Boucher brothers (Bob and Roland), electric power was also gaining popularity. The brothers' influence and participation are still evident today.

Doris and Bob Rich after successfully completing their coast-to-coast flight in October '75. Quite an achievement!

1980-Present

In terms of growth, the most recent decade represents one of the most dramatic periods that *Model Airplane News* has ever experienced. There were many contributing factors, including the publishers' long-standing commitment to provide modelers with the type of material they most want. Reacting to the expressed needs of readers, coverage of cars and boats has been introduced; construction articles dealing with the newest, high-performance designs, like Wolfgang Matt's Arrow and Ivan Kristensen's Saturn SE, were presented for builders to duplicate. Recognizing some of the emerging trends, *MAN* introduced monthly columns that deal specifically with some of the more specialized areas of our sport, like giant scale and, later, ducted fans. As shown by the recent introduction of our "Helicopter Section," being responsive to trends is still a foremost objective.

It was during this period that the term "high tech" came into being, and it's naturally applied to the new technologies and materials becoming more abundant in our sport. It definitely applies to things like PCM radios, which eliminate virtually all the interference-induced anxieties of radio operation with which we lived just a few years ago.

Composite, "space-age" materials (like carbon fiber, Kevlar, boron, cast Mylars and nylon-epoxy moldings), along with vastly improved manufacturing techniques (which make some of the "old" materials even better), e.g., injection-molding polystyrene, molding lightweight fiberglass parts and heat-shrinking covering materials, are just a few of the recent advances that make participation more enjoyable. Of all these innovations, however, one clearly emerges as a catalyst that's involved more people in R/C: the ARF. Almost-Ready-To-Fly airplanes have been around for quite a while, but they've only recently reached a high level of acceptance. Much of this results from the higher quality now achieved, the wider variety of types available, and the demands made on our "leisure time" activity allotments. Love them or curse them, you certainly can't ignore them!

MAN's "look" has changed most dramatically during this period, too. We've taken a fresh look, but "stepped back" to re-acquaint our readers with the importance of the word "airplane" in our title. We've presented numerous articles on full-scale airplanes. These have been most expertly prepared by Budd Davisson, who is a natural link between full-size planes and models, and this connection is appreciated by aviators and modelers around the world.

While today's technologies, at least in the full-scale aerospace world, focus on stealth, space, "low-observables" and low visibility (like the B-2 bomber and F-117A fighter), we at *MAN* have reached a philosophical point of departure with these concepts; our next series of challenges will be to further identify and react to what readers want and to create a more highly visible publication. So strap in and prepare for the *next* 60 years!

Small Steps

by RANDY RANDOLPH

Randy Matley's .010-powered Li'l Roughneck.

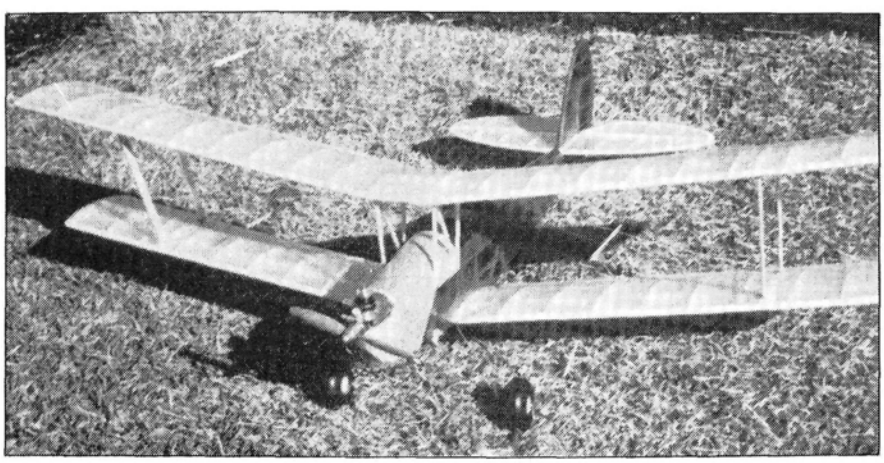
THERE JUST ISN'T any limit to what can be done with small airplanes! As a general rule, model airplanes don't perform as well at higher elevations. The air contains less oxygen for engines to breathe, and, because it's thinner, it provides less lift for wings. For this reason, modelers who live in parts of the country blessed with higher altitudes tend to fly airplanes that sea-level dwellers would consider overpowered. Well, most of them do, but not all!

Randy Matley lives in Idaho at an elevation of 3100 feet and he flies .010-powered R/C airplanes. He writes:

"Here are some photos of a couple of aircraft powered by the Cox* .010. By far the most successful is the Pipsqueak, which was designed by Dave Robelen. I installed two Cannon* microservos with Futaba* 2-channel receiver and four Eveready CH150T 150mA batteries. The total weight is 7.5 ounces, and the little ship really performs with the .010 peaked out! It will ROG, loop and spin like a demon, and, with the .010 really screaming, it will do sort of a roll.

"The wing is covered with tissue and fuselage is simply doped. According to Dave's original article in *RCM*, the model was a scaled-down version of the Midwest Esquire. The construction article was in the April '66 issue of *RCM*.

"The other model is a Li'l Roughneck, designed by Aubrey Kochman and kitted by Sterling back in the '60s. It has been moderately successful with the Ace R/C* pulse unit, but a more sensible arrangement would be to use a Cannon miniservo for rudder only, or two for rudder and elevator. Construction is all sheet balsa, and it weighs in at 8 ounces with the pulse equipment. I haven't tried it with the modern system."

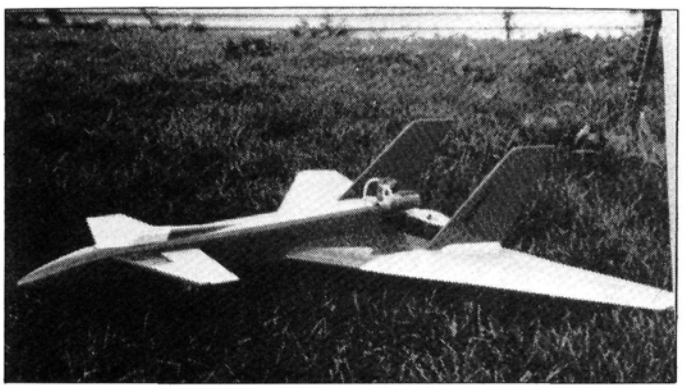


This giant biplane has a Cox .02 up front, and it's muffled at that!

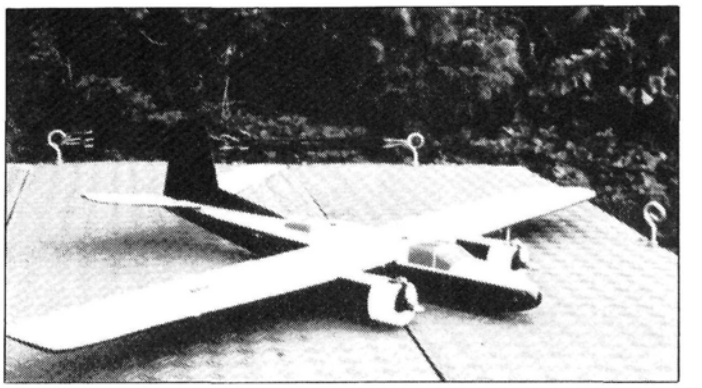
Unfortunately, the photo of Randy's Pipsqueak just wouldn't reproduce, but two other photos show more of his efforts. This Schoolyard Tiger is a much bigger airplane; it's powered by a muffled Cox 020 and covered with silk and dope. It was built from a March '75 *RCM* article by Walt Mitchell, and it's flown with Futaba microservos providing the muscle. Randy has been building only smaller airplanes for the last few years, which shows he has good taste!

The following is a letter from the only qualified vineyard-fieldway landing instructor in the world, Captain Pete Plassmann, and he sent along a couple of photos of his airplanes. Pete didn't say where he was, and his APO address didn't help, but his airplanes are worth talking about. He said some nice things about the column, then went on:

"I find it much easier to be creative with



The Wawazat—Pete Plassmann's design for wine-country flying.



Pseudo B-26 uses spray-can tops for cowls and Black Widows for go.

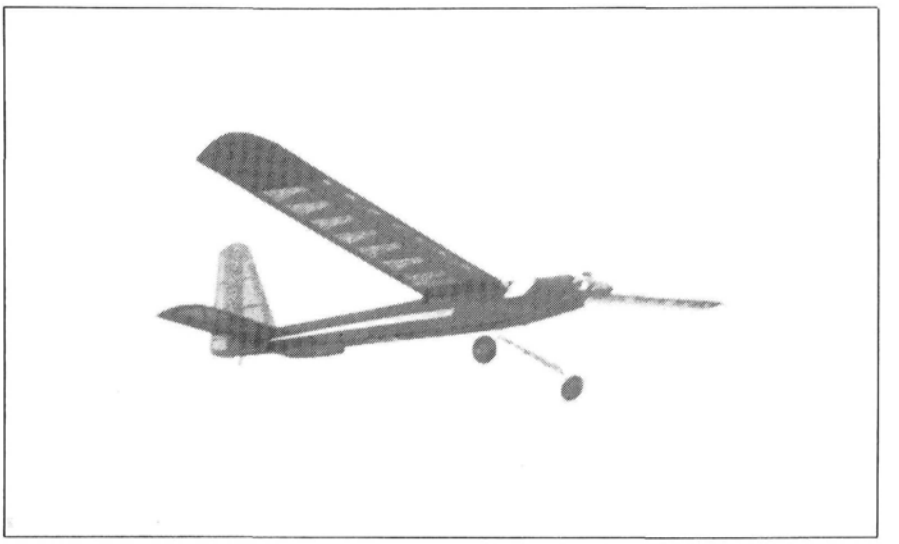
small aircraft, and I don't have to tie up a lot of money in huge motors. I'd really like to see a small ducted fan, along the lines of the old RK-049. Perhaps the new RK-709 (December '88 "Jet Blast") is the ticket.

"The Canard is my own design, and it flies extremely fast. It spans 36 inches and is powered by an O.S.* .25 FP. It takes off and lands very fast and requires a paved runway—sort of like a poor man's ducted fan! Since I haven't found a club with a paved runway, I've been using the paved fieldways in the vineyards. They're really narrow and lined with obstacles, so it makes landings really interesting!

"The Twin is my sorta-scale, 2-channel B-26 that's powered by two Black Widows with auxiliary tanks. It flew great on its first flight until the left engine went dead. Since I rebuilt it, it now has counter-rotating props to control engine-out torque. Cowlings were cut from spray-paint caps."

Pete's remarks about ducted fans should have been directed to our Editor, Rich Uravitch. Rich is one good man with fan designs and is just the guy to come up with a good small squirter here in *MAN*.

John Gill has an answer to the problem of leftover (or botched-up!) pieces of balsa that always collect at the back of the workbench. The Scrap Stick is intended as a way for Dallas R/C Club members to help reduce this type of environmental pollution. The plans will appear as installments in the club newsletter, so the Scrap Stick can be built one piece at a time with little investment of cash or labor.



The pollution fighter! A .09-powered Scrap Stick by John Gill.

The original airplane is powered by an old Cox .09 and is a great flying machine. The design parameters are for engines in the .074 to .20 range using 2- or 3-channel radios. The Scrap Stick would make a good club trainer for new members, as well as a "new equipment check-out" airplane for the old-timers. The Dallas R/C Club* newsletter is available for $15 a year from the club treasurer, Drew Jerina, and it's worth every dime!

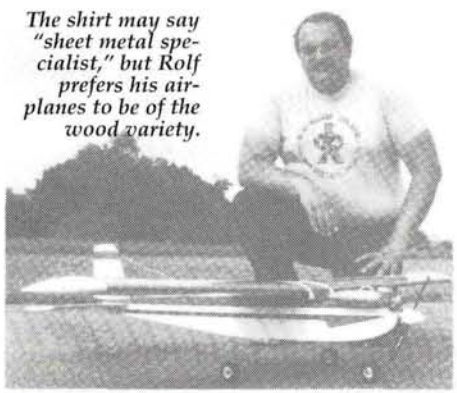
**Here are the addresses that are pertinent to this article:*
***Cox Hobbies,** 1525 East Warner Ave., Santa Ana, CA 92705.*
***Cannon R/C Systems,** 2828 Cochran St., Simi Valley, CA 93065.*
***Futaba,** 4 Studebaker, Irvine, CA 92718.*
***Ace R/C,** 116 W. 19th St., Box 511C, Higginsville, MO 64037.*
***O.S.;** distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, Il 61820.*
***Dallas R/C Club,** c/o Drew Jerina, 3109 Bluff View, Garland, TX 75043.* ■

Low-angle shot of review model shows its straightforward lines and tasteful trim scheme. Beginners will appreciate the "repairability" of balsa structure.

HOBBICO

AVISTAR 40

A new ARF that any newcomer will feel comfortable with... quickly!



The shirt may say "sheet metal specialist," but Rolf prefers his airplanes to be of the wood variety.

by ROLF KLUGE

OF THE ARFs I've assembled, the Hobbico* Avistar 40 has been the easiest and most enjoyable to work with. The kit is very complete and typical of what I've come to expect of some of the newer ARFs. The quality is excellent, and it's obvious that a lot of thought has been put into the design, with the novice R/Cer in mind. *I* sure appreciated how well it went together! This model starts looking impressive as soon as you open the box. Its red-and-white film covering is eye-catching, and each of the components is well-protected in the box. The instructions are clear and well-illustrated—another advantage for the fledgling flier.

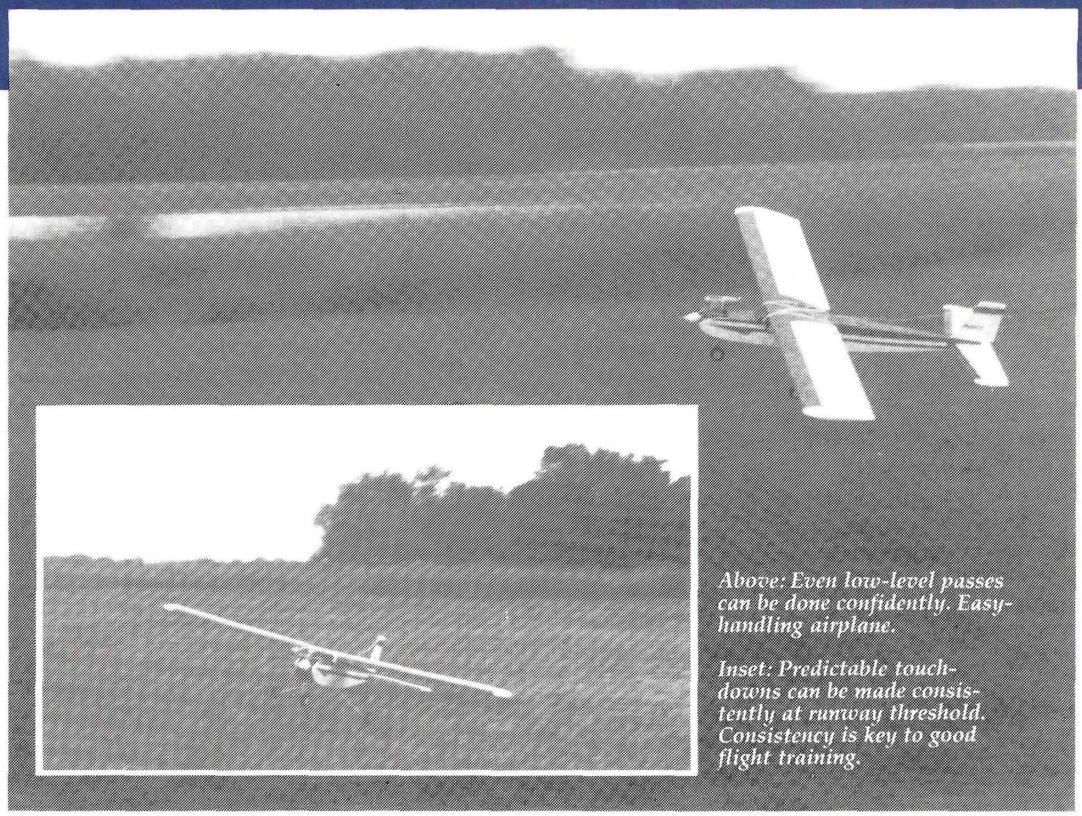
ASSEMBLY: Completing the fuselage with all the control linkages to the tail surfaces and throttle was easy. All the holes were pre-cut or drilled, which is unusual for most ARFs. Even the throttle-linkage hole was pre-drilled! The only change I had to make was to elongate the slot on the fuselage side in order to have enough movement for the elevator. The mounting holes for the engine were (naturally) not pre-drilled because of the variations between various engine types and sizes. I use a Magnum Pro* 45 ABC engine in my Avistar, and this produces plenty of power.

The Futaba* 148 servos fit the pre-cut servo tray perfectly, without any trimming. When installing the elevator, I had to cut a notch in the rear fuselage compartment bulkhead (at the trailing edge of the wing) to allow sufficient movement of the servo arm and rod. In retrospect, turning the servo around would have helped.

The radio systems I use are either the Futaba 5-channel FM or the 5-channel PCM (1024), depending on the type of aircraft. As a novice, I've found that the basic, no-frills 4-channel radios have much less flexibility of installation and you frequently can't reduce throw enough (desensitize the controls) by just moving

SPECIFICATIONS

Type: *ARF Trainer*
Wingspan: *60 inches*
Wing Area: *600 square inches*
Weight: *4 1/2 pounds*
Engine Used: *45 Magnum Pro ABC*
Radio Used: *Futaba 5-Channel PCM (1024)*
Suggested Retail Price: *$144.95 (pre-covered)*
Building Time: *Six hours*
Features: *Highly prefabricated ARF. All building and covering is complete, requiring only assembly of component parts. Pre-cut, pre-drilled servo mounts. All necessary hardware is included.*
Comments: *A very attractive, easy-to-assemble trainer that should appeal to the novice R/C flier. Highly visible color and trim makes orientation much less of a problem. A good-flying confidence builder.*



Above: Even low-level passes can be done confidently. Easy-handling airplane.

Inset: Predictable touchdowns can be made consistently at runway threshold. Consistency is key to good flight training.

to different linkage holes. The 5-channel systems generally have dual (variable) rates that you can decrease or increase as your flying skills improve. The initial cost may be a little more, but the versatility it provides is worth it!

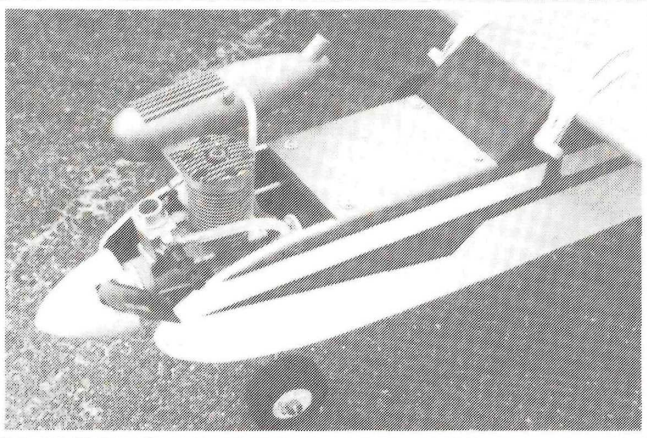
Moving on to the wing construction ... again, everything matched and fit perfectly, including the aileron servo and the servo tray. When joining the wing panels, be sure to use *epoxy* on the halves. *Do not* use CAs for this, or you could have a very "shattering" experience! Thirty-minute epoxy works best here, because it gives you time to align the panels.

Here are a few minor, but important, pointers:

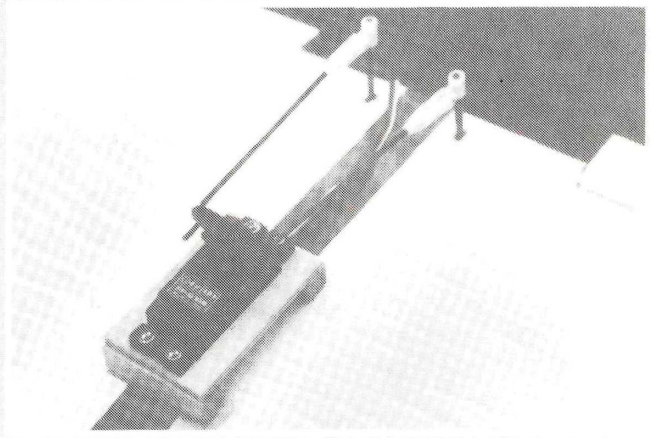
- You'll find it easier to install the rudder and elevator pushrods through the rear of the fuselage before you install the rudder and elevator control surfaces.
- Be sure to epoxy into place all hinges for all movable control surfaces before final assembly.
- Install landing the gear last: It's easier to work on a flat surface rather than chase the plane around the table.
- For those unexpected hard landings, be sure to wrap your receiver and battery pack in foam.

The instructions cover these steps, so consider these as just reminders.

The tank for the Avistar is large, but there's adequate space to hold it in the nose. It looks as though it will hold enough fuel to



The Magnum 40 engine provided more than enough power for the Avistar. Tank access hatch is retained by four screws. A nice feature: The muffler's exhaust tip can be rotated to deflect oil away from airframe.



Aileron servo installation is typical: ply plate attached to two hardwood bearers. "Z" bends used at servo end of pushrods.

READERS' REPORTS

WELL, HERE'S ANOTHER retiree returning to model aircraft, after a layoff since 1960. I built and flew U-Controls when we knew little about R/C.

I re-entered the hobby with the Hobbico Avistar 40 ARF, which was a cinch to construct by following the well-worded and illustrated instructions. My prior knowledge resurfaced and fell right into place.

I've joined the local Sky Blazers Model Aviation Club in Michie, TN, with President Bill Browder "wringing out" the Avistar on February 12, 1989. Yes, I got a little stick time, but Bill was nearby to grab the transmitter (the O.S. 40 ran beautifully).

MAN is the best magazine, and I've learned lots about R/C, which was totally new to me. Of course, there's lots more to learn!

JOHN H. YOUNG
Savannah, TN

YOU ASKED FOR comments on the Hobbico Avistar: The kit(?) is a good buy with a reasonable price. For 20 bucks, you get a conventional kit and the covering and hardware, and it flies great. There are, however, some problems.

I discovered the first problem while putting the wing halves together. If I hadn't built a few airplanes before (about 50 years' worth), I would have epoxied the aileron links to the balsa. I was able to avoid a problem by spotting it in advance.

The second problem is that the radio is positioned too far back to balance. I moved it about 3 inches forward. It then became impossible to use the cockamamie nose-wheel pushrod they showed (the 10-ounce tank was in the way), so I wound up with the nose wheel (ol' reliable Du-Bro flexible cable) and rudder pushrods on the same servo arm, on the same side of the servo.

The plane is powered with an Enya 40, which can't suck up the fuel at top rpm. The engine is too high above the tank floor, so I strapped an 8-ounce tank on top of the cowling, and now I have a ball! I suggest using a smaller tank and raising it above the cabin floor. With 6 or 8 ounces, you can get a respectable flight time with a 40; 10 ounces, and you're late for lunch.

Thanks for the opportunity to contribute.

WALTER KENT
Glen Rock, NJ

I WAS VERY EXCITED to be invited to share my opinion of the Hobbico Avistar 40 ARF with your readers. The kit includes instructions for assembly that are above average, and I'm extremely pleased with the airplane. It balanced perfectly and now has about 15 flights on it. It flies extremely well with an O.S. 40 FP. This is my first powered R/C airplane (I've been involved with R/C boats, cars and gliders), and everyone I fly with in the Spillway Flying Club near New Orleans has commented on the excellent flying characteristics of the Avistar 40. It's both a great trainer and sport airplane. It can do aerobatics and is very forgiving—an exceptional model from which to learn R/C flying!

The finished model proved crash-worthy when I dug a hole in mother earth after the engine richened up and killed while inverted on its fifth flight. The only damage was to the front-wing dowel area, but it was flying again the very next day. The problem is probably because the fuel tank is located 1 1/2 inches below the level of the needle valve.

My friend Bob Porter made a necessary modification during assembly; he fabricated an aluminum plate motor mount. The hardwood beam mounts were too far apart for the O.S. 40 FP, even though this is the recommended engine. The plate was bolted to the beams; the engine was bolted to the aluminum plate. This raised the engine above the fuel tank another 1/8 inch. Also, the nose wheel had to be epoxied to its hub when fast landings caused it to come off after 10 flights.

I suggest running an iron, set at low heat, over all the covering on the wing (except on and between the ribs) before assembly. The covering kept peeling off the bottom trailing edge of the wing during its first three flights and had to be patched (I used white Econo-Kote). I personalized my model using MonoKote white trim and MonoKote WW II markings. The AMA numbers are Coverite 2-inch graphics.

I'm pleased with the quality of the kit and with how easily it went together. Even more, I'm genuinely thrilled with how well the model flies, and I'm having great fun going through the levels of learning to fly R/C with the Hobbico Avistar 40. I highly recommend it!

MIKE OLIVER
Metarie, LA

circumnavigate the globe with the 45 at reduced power settings. The tank position is a little lower than ideal (according to what I've read), but there's no practical way to raise it. Some engines may have a problem with fuel feed, although muffler pressure might help. The CG came out exactly where indicated, and I didn't have to use any additional weight.

PERFORMANCE: At slow speeds, the Avistar flies great—just hanging there at minimum power (slightly above idle); at high speeds, it loops and rolls with ease. Although the rudder *looks* small, it's adequate for stall turns. The nose-wheel steering is extremely sensitive, so I suggest that you adjust the linkage to provide minimum throw at the steering arm.

As a trainer, the Avistar 40 on low rates (minimum throw) is one of the nicest, most easily flown ARFs I've tried. Construction and material selection are excellent: It's all wood, and the pre-finished polyester film covering can be easily repaired.

Since I'm a novice flier, all my planes are ARFs, and I recommend the Avistar 40 to anyone who's getting started in R/C.

**Here are the addresses of the companies mentioned in this article:*
Hobbico, *P.O. Box 778, Champaign, IL 61820.*
Magnum Pro; *distributed by Global Hobbies, 10725 Ellis Ave., Fountain Valley, CA 92728.*
Futaba, *4 Studebaker, Irvine, CA 92718.* ■

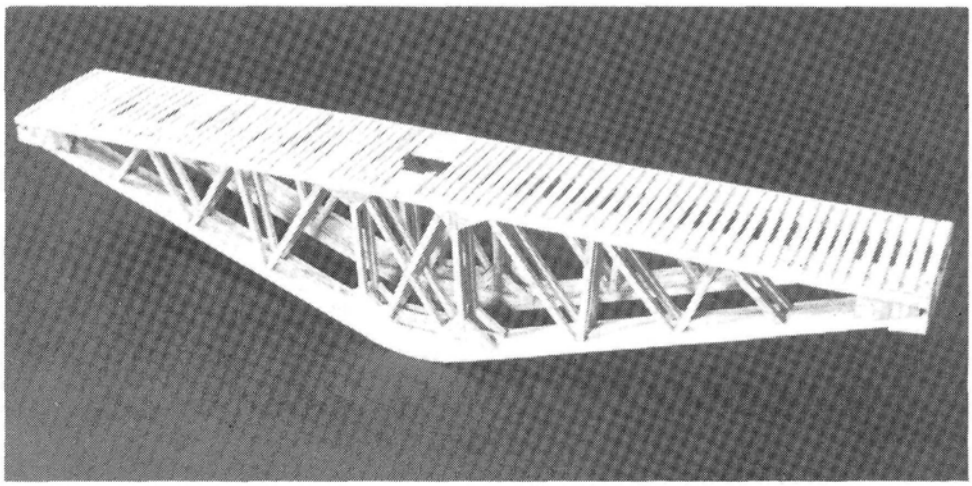
Building Model

by JOE WAGNER

THERE ARE SURELY a *lot* of available materials with which to build miniature airplanes, but, unquestionably, the most versatile stuff for model aircraft construction is balsa. It's been my favorite for over half a century, and Top Flite's* Scott Christensen prefers it, too. In a recent letter, he wrote: " ... Balsa wood will always be my *first* choice! It's a material I'm familiar with, comfortable with, and—most important—a material that *works* ..."

Too few modelers are aware of the full range of grades of hardness and strength in which balsa can be bought. The lightest weighs about 3 pounds per cubic foot (a 1/16x3x36-inch sheet weighs a mere 2/10 of an ounce!), and the heaviest is denser and stronger than spruce. True, you don't find this wide a selection of balsa in the average hobby shop. Yet, it can be had: Lone Star Models* (owned and operated by long-time modeler Riley Wooten) and Superior Aircraft Materials* (started by AMA Hall-of-Famer Sal Taibi, and now run by his son Mike) can mail-order just about anything anyone could want in the way of balsa. Yes, custom-selected wood costs extra, but it's not as bad as one might expect. The last order of custom-cut balsa I received from Lone Star came to little more than what I pay for stock wood at the hobby shop I patronize.

In the search for greater strength, many model builders have turned to spruce or fiberglass, or even more exotic materials like Kevlar or boron fibers. Let me tell you something about balsa's strength! In recent years, a science fair type of competition has become popular in high schools. One of the major events is the Bridge-Breaking Contest. In it, competitors design and build model bridges entirely out of 1/8-inch square balsa sticks and weighing no more than 2 3/4 ounces. Each must span a 16-inch gap, while a load is suspended from the center that's steadily increased until the bridge breaks. The one supporting the highest load is the winner. (These models also have to simulate practical vehicular bridges: a Hot Wheels car must be able to roll across without hindrance.)



Built entirely from 1/8-inch square balsa sticks and supported only at its ends, this 2 1/2-ounce model bridge (16 1/2 inches long by 2 inches wide), held 208 pounds suspended from its center. Balsa is strong!

How much dead weight would you expect a balsa structure weighing under 3 ounces to hold across a 16-inch gap? Well, in a recent contest, nine bridges were entered, all of them well-constructed and showing much ingenuity. Most of the entries held between 25 and 30 pounds before failure. The 2nd-place winner supported 94 pounds before it broke: not bad for a 2 1/2-ounce balsa assembly.

But the winning bridge sustained 208 pounds! It took almost all the available weights before finally giving way when a shear joint at one end split. The model wasn't even badly damaged. Because of its design, it tipped over sideways at failure, and the load got dumped, rather than crushing everything to kindling. The bridge can easily be repaired to compete in next year's event.

What made the tremendous difference between the 1st-place bridge and the others wasn't harder balsa or stronger glue. It was simply an adequate understanding of how to design and construct with balsa to take maximum advantage of its properties. Its maker was one of my model-building students, to whom I had carefully taught the best techniques for balsa woodworking. I gave him advice on his bridge design, of course—but he's the one who drew the plans for, and painstakingly assembled, the winning entry. It supported 1331 times its own weight before failure!

You can see what fantastic strength there is in a balsa structure. There are two main "secrets": closely-fitting joints designed so they're loaded in Compression or Shear, rather than in Tension; and wood located so that as much of it as possible is stressed in Tension or Compression, instead of Flexure or Torsion.

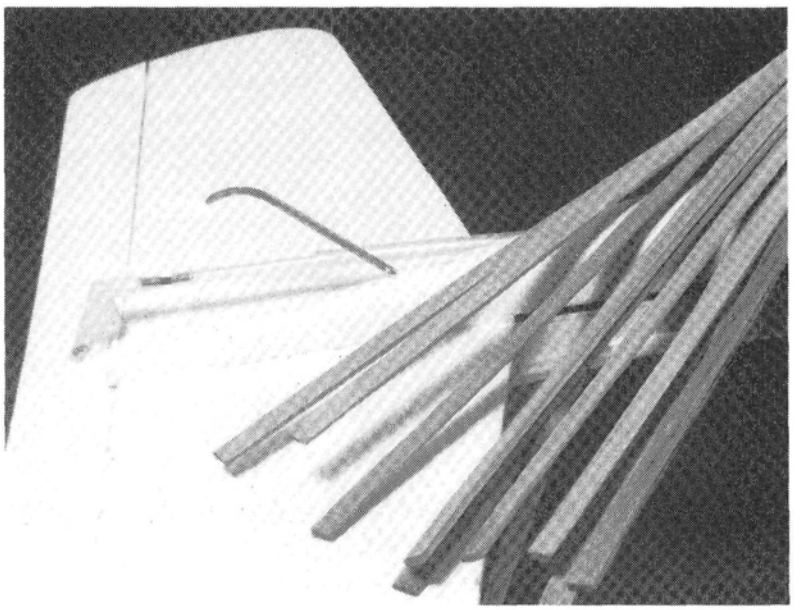
One other important factor in balsa's building strength is its smoothness. Light or hard, a piece of balsa (or any other structural material, for that matter) will always fail at a "stress concentration." Usually, this means a place where the cross-section changes abruptly, such as at a sawmark across a balsa sheet. The thicker material on either side of a flaw like this doesn't improve strength. In fact, being thicker makes it more rigid, and this

concentrates stress even more directly at the flaw.

Sanding a rough-surfaced balsa part smooth usually makes it stronger, and it saves weight. Some modelers seem to loathe sanding; they avoid it as much as they can by popping parts out of die-cut sheets and gluing them directly into place, and by leaving the edges of tail surfaces square-cornered. This reduces the time they spend in model building, all right. It also reduces the strength, flight performance and longevity of their airplanes. As for me, I'll keep on sanding.

New abrasive products on the hobby market make sanding less tiresome a chore these days than it used to be. I've mentioned D. G. Products' Permagrit sanding tools in an earlier column; now the Powermaster* folks have come up with some neat and highly-useful "Super Sanders," double-sided tools in handy sizes. Two are shaped like manicurists' emery boards, but about 50 percent bigger; another is a 3 1/2x4-inch rectangle. All have a core of semi-flexible foam rubber, coated on both sides with what I think is aluminum oxide abrasive. Two combinations are available: coarse/medium and medium/fine. (The coarse and medium grits are about the same as on the Permagrit tools, while the fine feels similar to No. 400 wet-or-dry paper.)

Powermaster's new abrasive tools cut faster and last much longer than emery boards or sandpaper. They're well worth adding to any modeler's tool kit.



Upside down, this modified Cox EZ Bee shows its heat-formed bamboo tail skid. Alongside are several strips of Old-Timer Models' high-strength bamboo.

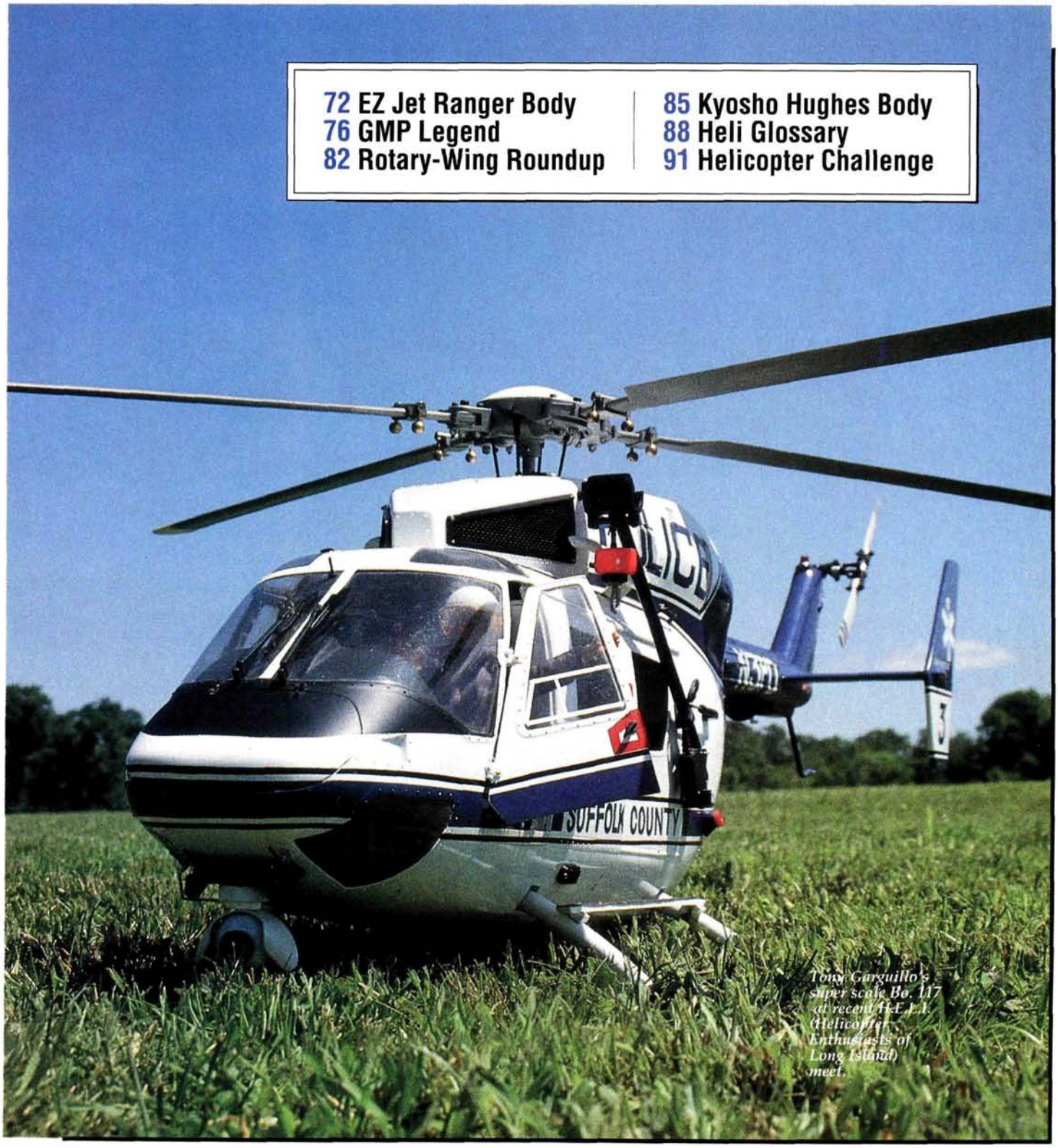
Die-cut model parts remind me of a trick I use to salvage "die-crushed" kit components. I can't bring myself to use them as is, with edges rougher than a broken brick, and sanding them down to smooth wood and making do with undersize parts is equally distasteful. Instead, I sand the edges smooth and square, and then I neatly glue on a strip of scrap balsa obtained from the die-cut sheet that had the original part. That adds sufficient material so I can easily re-shape the part back to its exact design contour.

Recently, I got a fat envelope full of samples of space-age model construction supplies from Composite Structure Technology*. Included were pieces of Rohacell (a German-made structural foam material supposedly superior to balsa in some of its properties), Kevlar cloth, and other "composite structural materials." Maybe I'm too old a dog to learn new tricks, but I wasn't favorably impressed by these samples or the accompanying technical information. For one thing, this stuff is *expensive*. A 1/8x12x48-inch sheet of 3.1 pounds/cubic foot of Rohacell costs

(Continued on page 108)

NEW MONTHLY

HELICOPTER SECTION



Tony Garguillo's super scale Bo. 117 at recent H.E.L.I. (Helicopter Enthusiasts of Long Island) meet.

PHOTO BY RICH URAVITCH

First in a series of alternative heli bodies from EZ for the .30-size machines

THE BELL JET Ranger is one of the most well-known helicopters in the world, and it has always been my favorite, especially as a model. Although fiberglass versions have been available for some time now, I don't have much time to build, so I've never been able to tackle such a project.

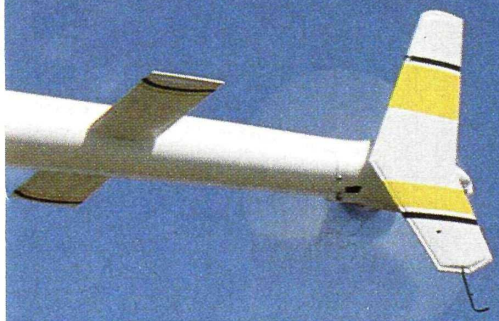
I recently had the pleasure of test-flying a buddy's Kyosho* Concept 30 helicopter. Although I'm not an expert helicopter flier, I've flown a number of different machines, and, so far, nothing compares with the Concept's stability and smooth control system. Those few minutes at the sticks were all it took: The next week, I was flying my *own* Concept 30.

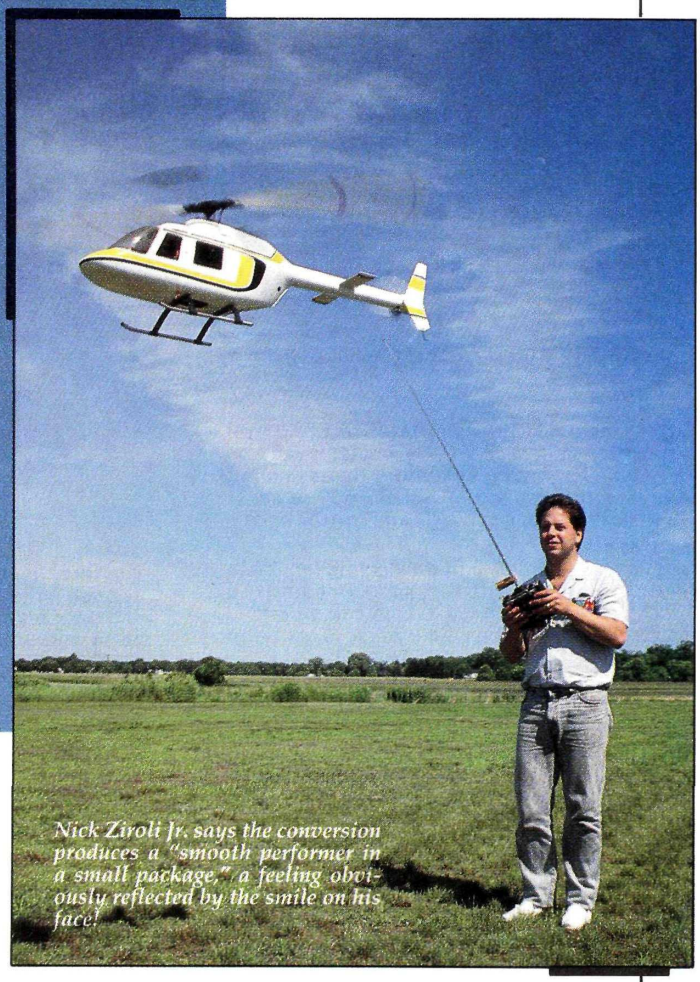
When I had sharpened my skills a bit, I was ready for a change. The Hobby Shack* EZ series had been ex-

PAD & BENCH REVIEW

EZ JET RANGER BODY CONVERSION

by NICK ZIROLI JR.





Nick Ziroli Jr. says the conversion produces a "smooth performer in a small package," a feeling obviously reflected by the smile on his face!

PHOTOS BY RICH URAVITCH

panded to include helicopter bodies, and I knew this would be a winning combination. The vacuum-formed Jet Ranger body comes complete with all parts pre-trimmed, hardware, decals and instructions. The body is designed to fit other 30-size helicopters, and instructions are provided to allow you to fit the body to your Shuttle or Baron 30 mechanics as well. Just be certain to follow the correct set of details; the clearly illustrated procedure eliminates guesswork.

The conversion starts by removing the original body, along with the skids and rotor blades. The tail-rotor pushrod clamps are replaced by tape to allow the mechanics to fit inside the scale tail boom,

In its stock form, the Concept 30 is attractive, but decidedly non-scale. Full "Pad & Bench" coming.

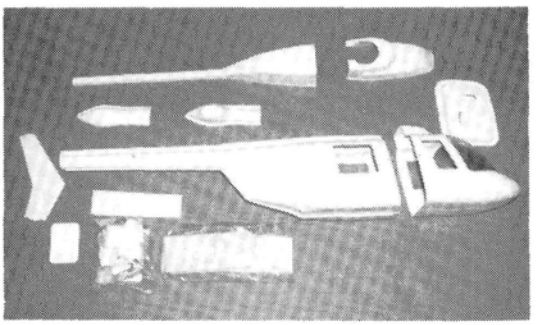
(Continued from page 73)

which is wrapped with foam rubber to keep the body parts centered. Plywood plates are laminated together and glued to the floor of the body to provide a hard point for mounting the chassis and skids.

Trial-fit the mechanics into the body. Be careful when trimming out for the cooling fan and muffler, because repairs to the body aren't easily made. I decided to use a muffler pirated from an old Shuttle, and this worked out very well, because it orients the exhaust outlet properly. You might have to rotate other mufflers 90 degrees to make them fit properly. Aluminum tape is used to protect the body from engine and exhaust heat, and its use shouldn't be disregarded.

A belt starting system is available for the conversion, but it isn't included in the kit, so I chose to develop my own method of starting my new Ranger. The starter cone (fully accessible on the original Concept, but now hiding in the Jet Ranger's fuselage) was replaced with a 5/16 socket-head screw. This enabled me to use the starting wand that I use frequently to start model jets. An almost unnoticeable hole is needed at the rear of the fuselage to accommodate the new wand. Because access is difficult later on, use Loctite* in this assembly.

Concept 30 with stock body and skid assemblies removed. Skids will be re-attached after installing new Jet Ranger body. Note starting "cone" modified to accept hex ball-driver shaft.



The "kit" as it comes out of the box. The only things not shown here are the instructions and an extensive Mylar decal sheet.

Four mounting holes were drilled through the bottom of the fuselage for the skids. To ensure proper alignment with the chassis, I used the actual skids as a drill guide. I found it difficult to replace the locknuts inside the body, and the instructions were very vague in this area. I chose to tap the existing holes in the side frames to 10-32; I was then able to sand-

(Continued on page 81)

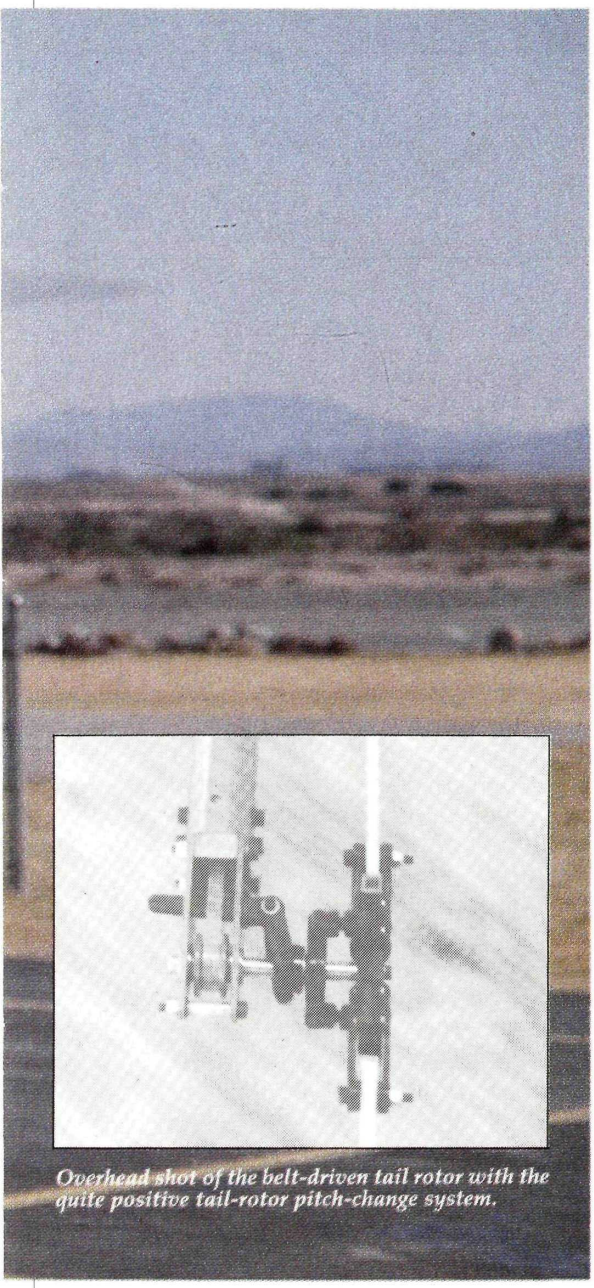
The engine selected for this project is this Webra Speed .61 ABC helicopter engine with Pro-Mix carb. Lots of horsepower to propel this relatively light machine.

GMP LEGEND

by CRAIG HATH

LAST SPRING, John Gorham of Gorham Model Products* called me because he was concerned about a statement I had made in one of my columns. I had written that model helicopters that use a flybarless rotor head are suitable for beginners. I confirmed that this was my opinion and that it was the result of experiences that I and other modelers had had with this type of machine. Usually, the flybar (or Hiller paddle system) is added to enhance the neutral stability of the helicopter, and

An in-depth look at the newest collective-pitch heli from Gorham



Overhead shot of the belt-driven tail rotor with the quite positive tail-rotor pitch-change system.

machines without flybars are often twitchy and more difficult to fly.

John told me about his newest offering—the Legend—and he asked me if I would evaluate it to see if it would meet the needs of the beginner. He said that the flybarless version of the Legend exhibited "neutrally stable" qualities that were unusual for any model helicopter, especially flybarless designs. Because John obviously felt so strongly about the Legend, I decided to give it a try.

A few days later, the kit arrived, along with one of the GMP gyros and an extra set of rotor blades. As I sifted through the box, I saw that many parts had been borrowed from previous GMP or Hirobo machines; yet much of it was brand new. A lot of literature was enclosed, including a detailed explanation of certain design concepts and kit features. The Legend is a lightweight, high-performance 50/60-class sport and contest helicopter that uses both metal and plastic parts. Features include a toothed, belt-driven tail-rotor system, pre-assembled flybarless rotor head, autorotation, and triple ball-bearing-supported main- and tail-rotor blades.

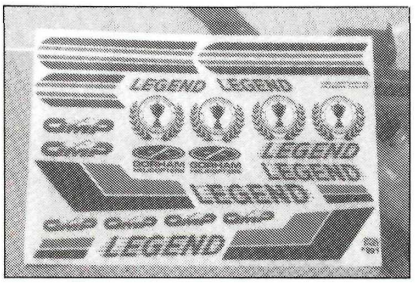
I could go over the construction process in great detail, but I don't think this leads to an interesting review of any kit. I prefer to point out a few items in the instruction manual that need a little more attention, or that were skipped entirely.

There are actually four instruction manuals for the Legend: basic assembly, controls set-up, main rotor blades, and how-to-fly manuals. Each manual is thorough, and the controls set-up and how-to-fly manuals were excellent. The basic assembly manual will be used most, since it contains instructions for the step-by-step construction process. I'll go through the assembly sequence quickly to point out a few time-savers, and I'll clarify some of the steps.

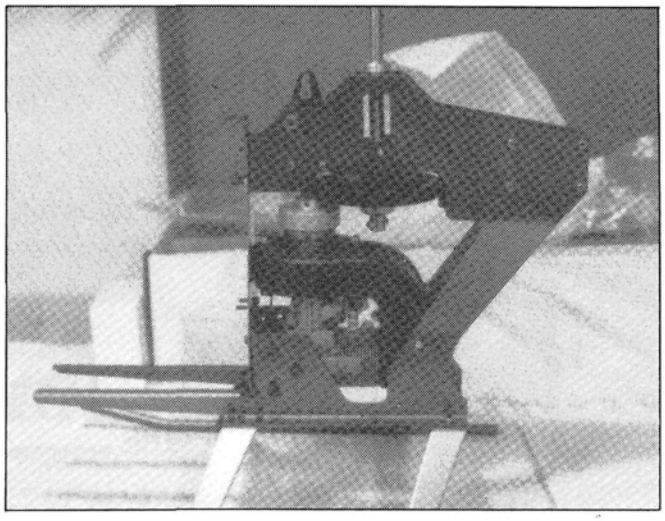
In Stage 1, be sure to check the run-out of the starting shaft at both the bottom and the top of the shaft, as it's possible to get the run-out within tolerance at one end and not at the other. If the bottom seems to be out quite a lot, remove the two clutch-retaining screws, turn the clutch 180 degrees, replace the screws and repeat the check.

Stage 4, Step 5 completely omits the installation of the mainshaft collar, No. 4071. Slide the collar over the main shaft all the way down to the top of the upper bearing block. Support the main gear from the bottom with one hand so that it's lightly pressed up

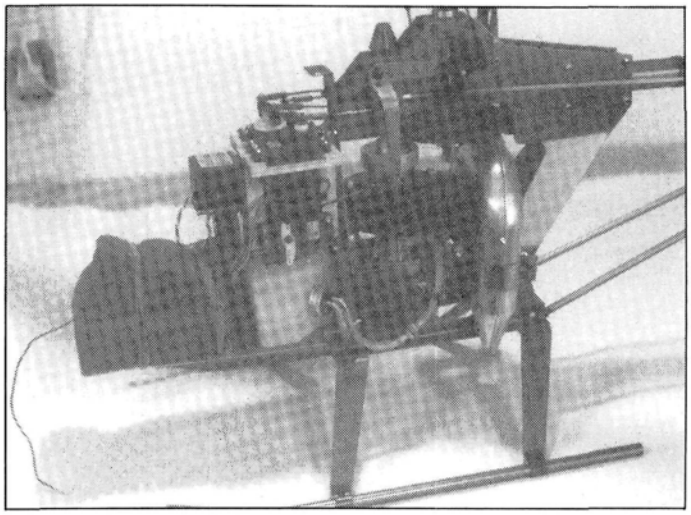
The Legend kit as it comes from factory, complete with documents folder.



The Legend decal sheet.



The completed first few stages of construction show the simple, yet effective, mechanics. Nothing added to slow it down.



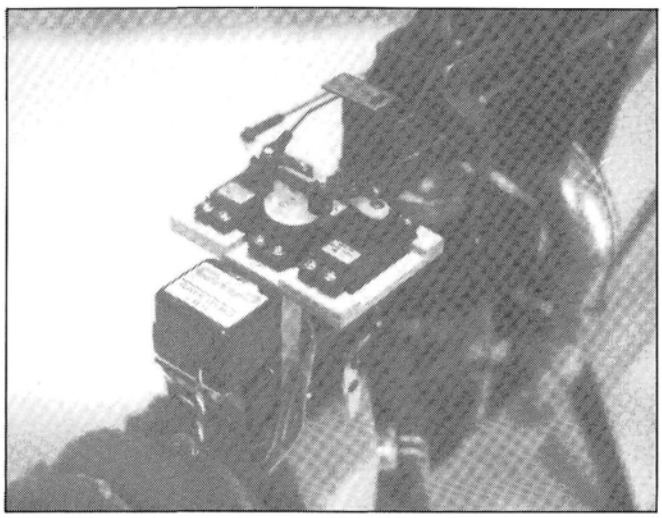
Completed mechanics and radio installation. Collective pitch and cyclic controls all are ball-bearing supported for slop-free long-life operation.

against the bearing retainers. Using Loctite* thread-locking compound, tighten the two 4mm setscrews with the other hand, and re-check the end-play of the main shaft by pulling up and down on the top of it. When the collar has been properly installed, there should be no vertical play in the shaft. If you plan to polish the two balls for the universal ball links, you must polish them on the collective-pitch yoke assembly before you sandwich it between the mainframes.

The small parts in Stage 8 can be confusing, but a close look at the drawings will help the process go smoothly. In Step 4, there's no mention of the position of the pitch/torque lever once it's tightened down. With the collective-pitch yoke assembly held level inside the mainframes, the pitch/torque lever should be positioned to point straight down.

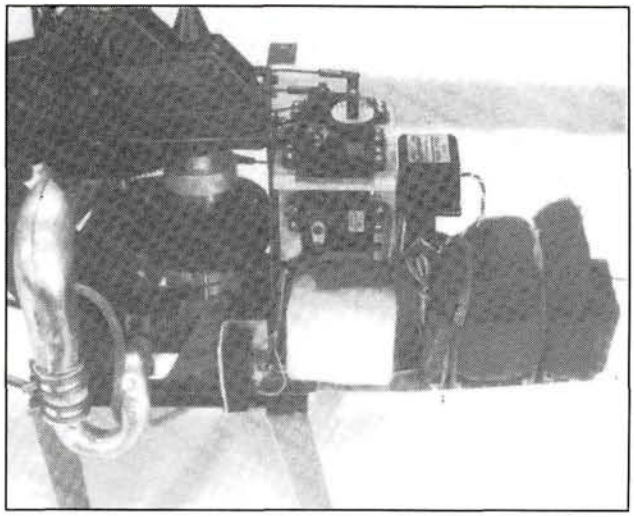
In Stage 10, I like to polish the balls that attach to all ball links. This takes a little extra time, but the results are a very smooth control operation. All the balls on the swashplate can be removed and carefully chucked into a drill. I start with 150-grit sandpaper and work through 220, 400 and 600 grit. Hold the paper firmly on the ball while spinning the ball with the drill. Be sure to replace the balls in the swashplate in the correct positions, and use Loctite on the threads of every one.

The drawing for Stage 11 shows the tail-rotor assembly. Polishing the tail-drive shaft will give you a very smooth tail-rotor pitch-control assembly. The Legend has one of the simplest, yet most positive tail-rotor pitch-change setups ever designed. Be sure that you don't mismatch the two side plates and cause the

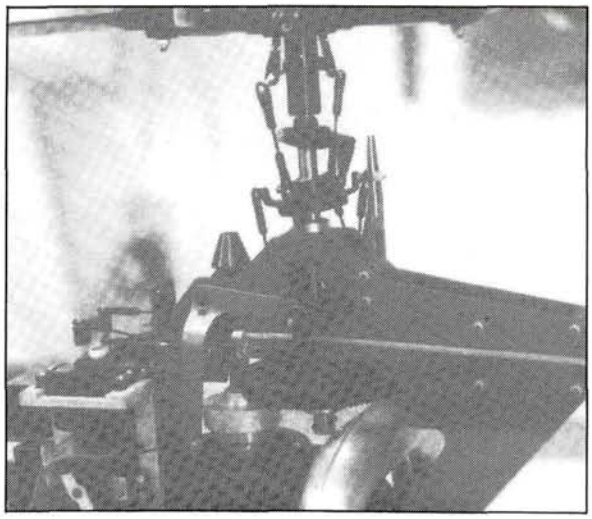


Head-on look at the servo tray and servo installation. Servo tray is made of plywood and is factory assembled. GMP gyro is an inexpensive unit that works extremely well.

The finished Legend shows off its aerodynamic canopy lines. Decals were combined with trim paint to give striking appearance and improve visibility.



Another look at the finished machine shows gyro installation and roll mixer. Pipe has been damaged by previous meetings with ground, but can be straightened.



Swashplate and rotor-head connections. Flybarless setup is similar to a Hiller in design, but simpler.

assembly to bind.

The tail surfaces are finished in Step 1 of Stage 13. I used K&B* Superpoxy primer mixed with enough K&B microballoons to produce a mixture with the consistency of pancake batter. Brushed on with a l-inch camel's hair brush, two coats were applied, and I sanded between coats. This process will completely fill the weave of the glasscloth, and it won't add much weight. The pieces will be painted at the same time as the canopy, which I'll discuss later.

The carrier unit assembled in

(Continued on page 110)

READER'S REPORT

GMP LEGEND

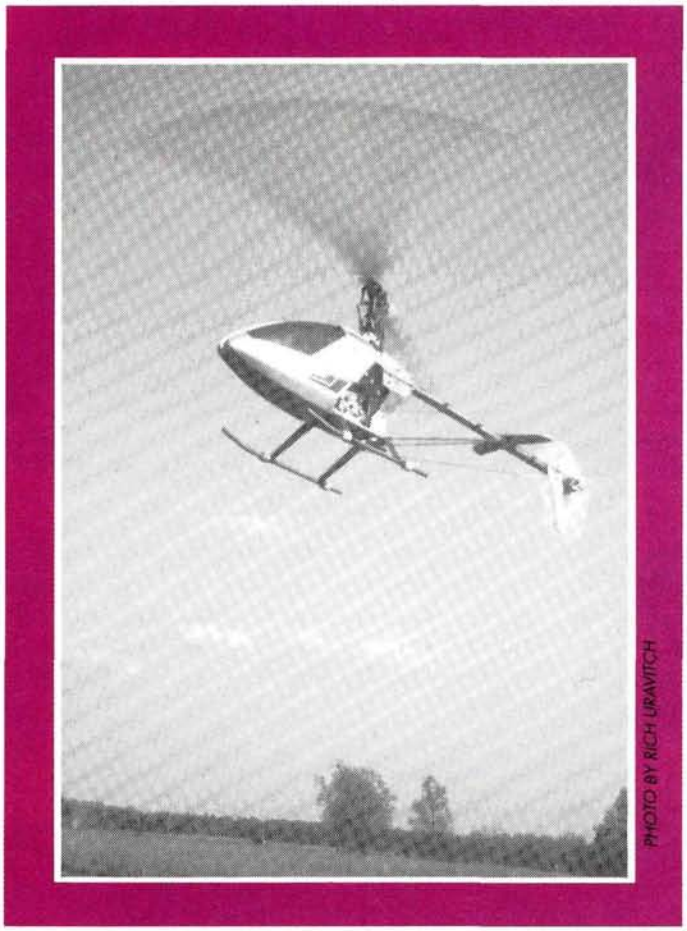


PHOTO BY RICH URAVITCH

DURING THE 1988 trade-show season, the rumor on the street was that Gorham Model Products was developing a new trick helicopter with a flybarless head and a belt-drive tail rotor. The benefits supposedly included hot aerobatics, great autorotation landings and very precise tail control. I decided to get one as soon as they became available, which turned out to be around late August, and it was worth waiting for the Legend.

GMP fans will feel really comfortable building the Legend. Aside from the fact that the aluminum parts are anodized gray, the mainframe, engine installation and gear train are much like those of the Competitor. Many of the parts that aren't identical are, at least, similar—but *improved*. The tail boom and some of the tail-rotor components are taken from the Stork design. The rotor head is shipped pre-assembled, and the wooden servo tray comes already glued together. Overall, the Legend has a pretty low parts count for a .60-size helicopter. That, coupled with a good instruction manual and some GMP familiarity, made the project go extremely fast.

Like most helicopters, assembly starts with the side frames, after which come engine installation, main shaft and gear, tail boom and gearbox, cyclic/collective controls and radio installation and canopy—in about that order.

The main shaft has a thrust bearing between the main gear and the lower radial bearing, and this reduces overall friction in the rotor system. The belt-drive tail-rotor system is very easy to install, and it's almost friction-free, since the toothed belt doesn't have to be stretched tightly.

The sliding swashplate is captured by the usual two fore/aft links as well as by two left/right links for more precise control. Instead of an antirotation link, the swashplate is positioned by a sliding pin in a vertical slot, so there's no interaction between cyclic and collective motion.

The machined rotor head is a typical GMP design, but the mixing arms are mounted on the side of the unit, because there's no see-saw on a flybarless head. Consequently, there's no need for a washout mixer assembly either, and the overall result is an extremely tight control system.

The head features the modern delta-3 design, which places the blade-pitch control links off the main-shaft center line for improved flight stability. Additionally, a newly designed tail-rotor pitch-control slider provides slop-free, but frictionless motion of the blade holders, which, by the way, incorporate two radial bearings and a thrust bearing.

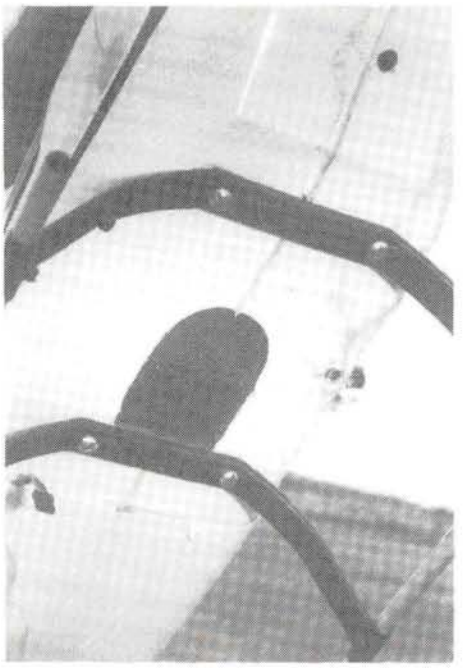
My first flights confirmed the stability of the Legend in a hover. However, the machine seems to need the recommended higher head speed of 1700rpm or so to achieve this stability. The Legend really hauls in fast forward flight and is super-aerobatic. The vertical climb is outrageous, and consecutive loops or rolls are easily accomplished. Tail-rotor response is positive and immediate. I initially used an un-piped YS .60 but, after a succession of engine failures and trips to the factory, I switched to an O.S. .61 SFN-H. A pipe will be installed shortly, however, but even without it, there's enough power for hot-dog flying.

Flying with the flybarless head does take some getting used to. It requires considerably more forward stick for fast, level flight. Relaxation of the stick results in a pronounced pitch-up, which is a characteristic of this design. This can be a little unsettling until you adjust to the required technique. Also, the overall feel of the machine at low speeds is a little less solid than might be desirable for precision contest work. So the Legend is really more like a rotary-wing hot-rod than a limousine. ■

by RON FARKAS

JET RANGER BODY

(Continued from page 75)



Underside of "fuselage" showing cut-out for engine cooling duct and hole for ball-driver starter shaft.

wich the body between the skids and side plates with 10-32 round-head screws.

The tail-boom cover is secured in place with very thin double-faced tape, which makes an almost invisible seam. Be careful, this stuff really sticks! Choose the proper tail cone for your mechanics and take your time when you fit this part, making sure it doesn't interfere with the tail-rotor linkage.

The molded horizontal and vertical stabilizers are joined over a balsa core, which requires a little sanding to ensure a proper fit. The horizontal stab is installed over an aluminum spar using CA, and the vertical fin with the tail skid is glued to a flat provided on the tail cone.

The main canopy, or forward fuselage, is secured with some very clever plastic fasteners that worked well on the thin plastic. Just push them through a hole in the two surfaces to be joined and that's it!

You'll have to be patient when you apply the pressure-sensitive decals. I recommend using heat (e.g., from a hair dryer) to help get the decals around some of those swoopy curves. I still ended up with a few wrinkles around the nose, but who cares?—I was almost ready to fly!

After re-mounting the rotor blades, I checked the CG (you might have to move your battery pack forward) and went to the field. The Concept flew well with the new body, and it was more visible than with a bubble-type body.

The few hours I spent on the conversion were well worth it. Besides, now I can distinguish my Concept 30 from the rest at the field!

**Here are the addresses of the companies mentioned in this article:*
Kyosho; *distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
Hobby Shack, *18480 Bandilier Circle, Fountain Valley, CA 92728.*
Loctite, *18731 Cranwood Park, Cleveland, OH 44128.* ■

Equipment accessibility is even improved over stock "pod" canopy with the extra window opening.

ROTARY-WING ROUNDUP

E&G ENTERPRISES HUGHES 530F FUSELAGE

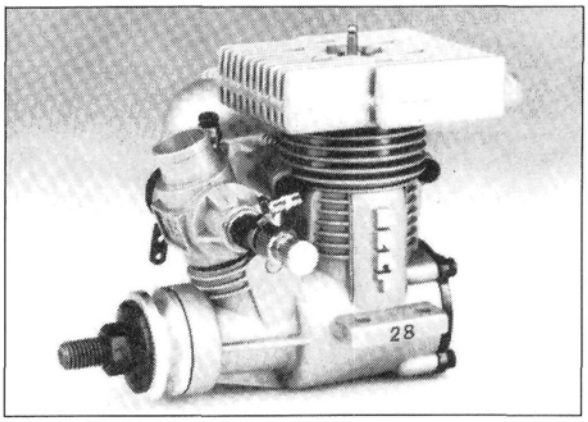
The sharp-looking Hughes 530F fuselage from E&G is designed for use with the GMP Shuttle or Circus Baron 28/30. The impact-resistant design consists of .030 clear, vacuum-formed plastic that keeps weight to a minimum. The kit is easy to assemble and allows easy, no-tools, access to radio equipment. Included in the kit are a longer starting belt, balsa tail fin and stabilizer, metal landing-gear struts, illustrated step-by-step instructions and all necessary hardware.

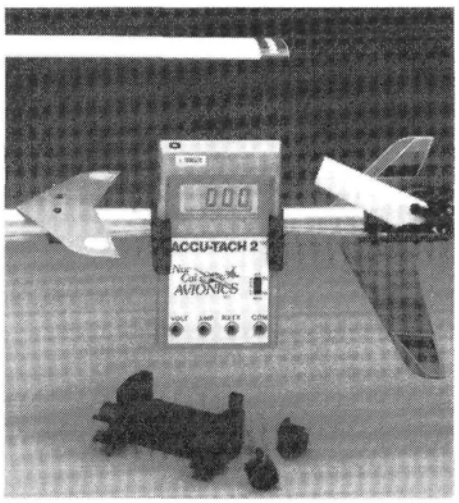
For more information, contact E&G Enterprises, 23015 Del Lago, #B-2, Laguna Hills, CA 92653.

WORLD ENGINES BRAT 28 ENGINE

The Brat 28 helicopter engine offers a revolutionary advancement in engine power. It uses an AAC piston assembly (an aluminum piston running in a chromed-aluminum cylinder sleeve). This makes a light engine that runs faster than the traditional ABC engines. Pistons and cylinders are totally interchangeable with no loss of torque or top rpm.

For more information, contact World Engines, 8960 Rossash Rd., Cincinnati, OH 45236.





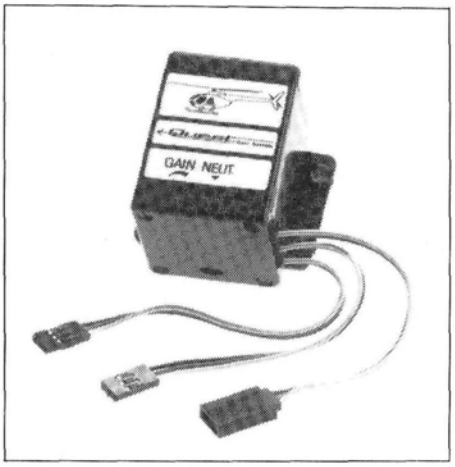
NOR-CAL AVIONICS HELI TACH BRACKET

This tachometer bracket from Nor-Cal Avionics is designed to be used with Nor-Cal's tach, thus allowing it to be attached to the tail-rotor boom. This will enable the helicopter enthusiast to accurately check rotor speed without being injured by the rotating blades.

Simply attach the tach to the boom with the tach bracket and run the engine up to speed. When you reach the desired rotor speed, bring the engine back to idle and remove the tach.

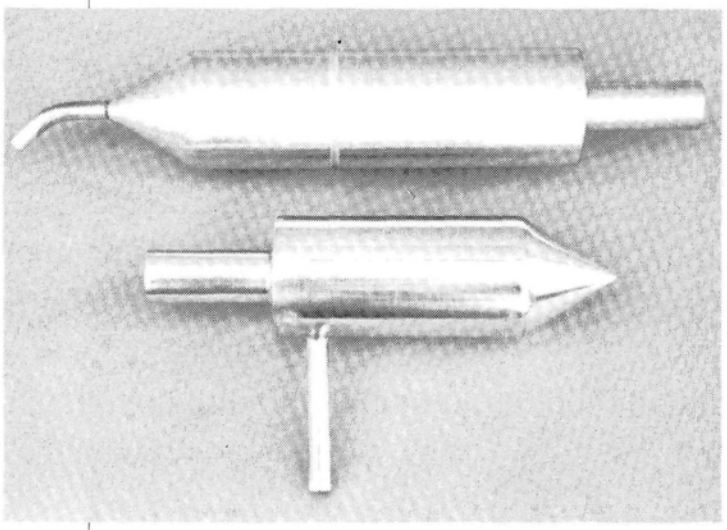
For more information, contact Nor-Cal Avionics, 5689 Glasgow Rd., Troy, MI 48098.

QUEST HELICOPTER GYRO SYSTEM



This state-of-the-art device is designed to provide helicopter enthusiasts with the best method of avoiding the tail-chasing characteristics of helicopters that *don't* have gyro systems. It's designed around a solid-state transducer that eliminates the friction and reliability problems associated with a potentiometer, and it's sensitive to the slowest yaw movement.

For more information, contact Century Systems, P.O. Box 868, El Toro, CA 92630.



DC DESIGNS WHISPER TECH & V-TECH

Robbe Model Sport now has the exclusive distribution rights to DC Designs' Whisper Tech and V-Tech exhaust systems. The systems have been successfully used by many FAI helicopter and pattern pilots for more than two years. DC Designs claims a 25-percent increase in horsepower over an open stack, plus an approximately 10-percent increase in rpm, while keeping noise to a minimum (72dB at 3 meters).

For more information, contact Robbe Model Sport, 180 Township Line Road, Belle Mead, NJ 08502.

KALT CYCLONE II

The new Cyclone II is equipped with a newly designed K-5 rotor head, which is a high-performance, single-axle head that mixes solid hovering characteristics with outstanding aerobatic capability. Items now standard on the Cyclone II are a tooth-belt tail-rotor drive and an autorotation clutch. The new streamlined body not only catches the eye, but it also gives the machine a sleek, aerodynamic profile.

The kit comes equipped with a Bell-Hiller mixer, a rear-mounted gyro compartment, and pre-balanced, pre-finished main- and tail-rotor blades. The pre-assembled Cyclone II is packaged ready for radio installation, so it's flight-ready in approximately 2 to 3 hours.

For more information, contact Hobby Dynamics, P.O. Box 3726, Champaign, IL.

KYOSHO

The best bleach bottle you've ever flown!!

HUGHES CONVERSION BODY

by DATU RAMEL

PHOTOS BY DATU RAMEL

KYOSHO* HAS INTRODUCED a line of three plastic fuselage kits for its Concept 30 helicopters. The kits, which are scheduled for retail distribution this summer, include: a semi-scale Hughes 300 (the real 300 has an upswept tail boom that can't be modeled by the Concept 30 tail drive); a scale Jet Ranger; and a scale Hughes 500E, which is the subject of this article.

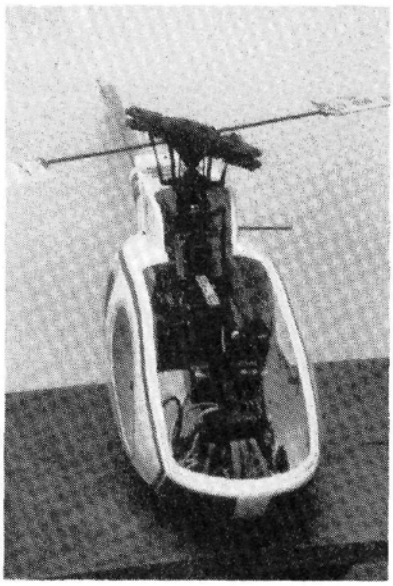
I don't have any flying shots of the finished helicopter because I didn't have the special Kyosho starter-shaft extension needed to fire up the supplied mechanics. I didn't paint this particular kit because Great Planes, the importer and distributor, asked me to evaluate the Hughes 500 in the context of the overall Concept 30 philosophy of ease of set-up and use.

At the Los Angeles and Toledo shows, crowd reaction to the Hughes 500 showed that everyone wants to fly a fuselage but not everyone wants to sand and prime fiberglass and to then worry about our sport's equivalent of taking your Corvette to the body shop after every hard landing. Vacuum-formed clear polycarbonate fuselages have minimized the need for tedious surface preparation and the installation of wood formers, but these extended canopies have had problems with the appearance of the glue seam and with the fit between sections. Kyosho's entry into the helicopter fuselage market uses the white blow-molded OHS plastic that's already featured in its line of ARFs. (Robbe calls its version of blow-molded material for model aircraft "Plura," and it's used in the very attractive Ecureuil fuselage for Heim mechanics.)

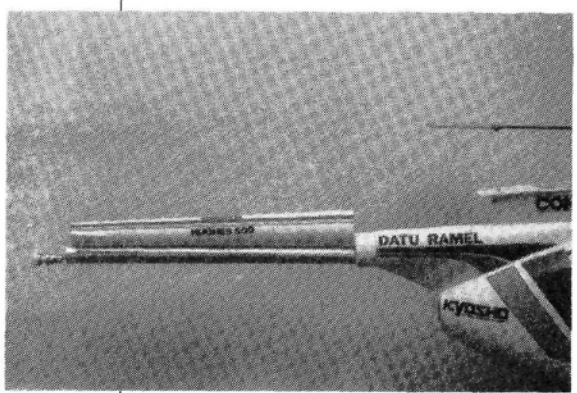
The unfinished forward section of the Hughes 500 looks like a 2-gallon Clorox jug when you first take it

Scale landing gear makes the Concept 30 mechanics look even smaller.

Quarter-front view of fuselage with windshield removed shows good access to servos and linkages.



Front view of fuselage with windshield removed.



Blow-molded tail boom above standard aluminum tail boom.

out of the box. OHS plastic feels like the stuff that the new quart oil containers are made of; it's light; it's opaque; and it springs back when you press it. The door-panel lines and the markings for the landing gear and cooling holes are molded in raised relief. There are no pinholes in the plastic, although there is a thin mold line along the bottom of the forward section. The horizontal and vertical stabilizer fins of the Hughes 500's characteristic T-tail are made of injection-molded white plastic—a reminder that there's no wood in this kit.

Instructions are typical Kyosho with a perspective line drawing for each assembly step. The instruction sheets' only weakness is that positioning and cutting the exhaust hole in the right rear of the body is left to your imagination—no doubt, owing to the variety of mufflers available (as well as the O.S. types I've been using) that might be installed on this .30-size machine. I plan to use a short length of silicone tubing to keep the exhaust gas away from the molded landing-gear struts.

The mold designer has provided us with a narrow internal flange, or sill, around the window openings, and this strengthens the corners and serves as a guide for cutting. I tried a Dremel wheel on one of the cutout areas, and I was pleased with the amount of dust generated (much less than when making holes in fiberglass), but I *wasn't* pleased with the possibility of melting the OHS material if I lingered in one spot!

After this test, I opted for the X-Acto knife-in-hand method suggested in the instructions. The flange ensures that minor slips of the No. 10 blade won't affect the desired curve of the window opening. You might want to highlight the inside edge of the flange with a Sharpie marker before proceeding.

I placed a strutless, boomless, and tail-less set of Concept 30 mechanics inside the fuselage for a trial-fit, and I was impressed by the designers' efforts to make their equipment easy to use. It's as if Kyosho kept the needs of the semi-scale pilot in mind while putting the finishing touches on the mechanical layout: The fuel line and needle valve are right by a window.

The radio and gyro switches are also at a window opening. The glow plug is easily reached from the bottom through the cutout that matches the cooling outlet. The starter-shaft opening at the rear of the body lines up with the 7-degree tilt of the engine.

The back of the molded tail-boom section (which will eventually rest against the tail-rotor case) has some mold flash that the instructions tell you to trim away. Keep the detached aluminum boom and tail-rotor link rod handy for test-fitting during this step.

Trimming the windshield calls for a pair of shop snips or scissors instead of a hobby knife. As with the window flanges, the mold line is easier to see if you use a Sharpie. Using tape, temporarily attach the windshield to the fuselage with tape for a test-fit; you might have to trim a little more at the corners, or where the sides of the body curve.

The kit has two sheets of pressure-sensitive decals. The smaller of the sheets is mostly text and warning material; the larger sheet has color stripes and strips for trimming the windshield edges. I decorate my helicopters to make them visible under overcast or "way-out-there" conditions, so I cut my own curved window strips out of MonoKote*.

I spent more time cutting and applying decals than I did cutting the openings or installing the mechanics, but it's still much less work than "Dremeling" and putting wood formers into a glass body. The

(Continued on page 113)

HELI GLOSSARY

To help readers who are just joining the ranks of R/C helicopter enthusiasts to understand some of the material presented in our helicopter section, we've prepared this glossary. It was compiled from a variety of sources, both full scale and R/C, and it contains the most widely used terms relating to helicopters. RAU

advancing blade: As the rotor spins around its shaft, the blade turning into the wind is the advancing blade. If the helicopter is moving forward, the advancing blade will be in the right half of the rotor disc; if moving backward, it will be in the left; if moving sideways to the left, it will be in the forward half; and if moving sideways to the right, it will be in the rear half.

airfoil: Any surface designed to obtain a useful reaction (in the form of lift) from the air through which it moves. A streamline shape of aerodynamic surfaces that are designed to produce a minimum of drag and a maximum of lift.

angle of attack: The acute angle measured between the chord of an airfoil and the relative wind.

articulated rotor: A rotor system in which the blades are free to flap, drag and feather. A mode of attaching the rotor blade to the mast. A blade is said to be "fully articulated" when it's similar to the shoulder joint in its root attachment. This joint allows the rotor blade to flap up and down, move fore and aft to lead and lag and twist around its own axis in a feathering motion.

ATS (Automatic Tail-Rotor System): This electronic mixer on a helicopter radio transmitter automatically varies the tail-rotor pitch to counteract the engine torque at different power settings.

autorotation: Self-energized turning of the rotor. Unlike "windmilling," where blade pitch is negative and energy is extracted from the rotor, autorotation is obtained with slightly positive pitch settings, and no energy is extracted from the rotor. This creates a maximum amount of lift.

bank: Sideward tilt of the helicopter. It may be necessary to keep the craft from skidding, or side-slipping, during a turn. In a correctly executed turn, the bank compensates for the centrifugal force, and the pilot is pressed straight down into the seat, without any side force.

blade: One of the blades of the rotor. Usually more than just one is used. If the rotor has two or three (or more) blades, it's described as a two-bladed or three-bladed rotor, respectively.

blade loading: The load placed on the rotor blades of a helicopter, determined by dividing the gross weight of the copter by the combined area of all rotor blades.

center of gravity (CG): A point where the weight forces in the body can be considered to be concentrated for any body position.

centrifugal force: The force created by the tendency of a body to follow a straight-line path against the force that causes it to move in a curve, resulting in a force that tends to pull away from the axis of rotation. Applied to the helicopter, the force that would make the rotor blade fly out if it were not attached at the hub.

chord: The length of an airfoil as depicted by an imaginary straight line between the leading and trailing edges of that airfoil.

chordwise balance: An engineering term that refers to the mass balance of the airfoil. It's usually made to coincide with its center of lift. If this isn't done, blade flutter could develop in flight, which might destroy the entire blade.

collective pitch control (collective): Affecting all rotor blades in the same way. Collective pitch control changes the pitch of all rotor blades in unison, thus varying the total lift of the rotor. The method of control by which the pitch of all rotor blades is varied equally and simultaneously.

cone angle (coning angle): The angle a rotor blade makes with the plane of rotation, similar to the dihedral angle of a fixed wing. Since the rotor blade is hinged at the hub, it's held out by centrifugal force, but since it also produces lift, it's deflected upward.

cyclic pitch control: Repetitive once-around-the-circle change in the pitch angle of each rotor blade as it turns around the axis. Cyclic control is also known as "azimuth" control, and its purpose is to tilt the direction of lift force of the rotor, rather than to change its magnitude. The control that changes the pitch of the rotor blades individually during a cycle of revolution to control the tilt of the rotor disc and, therefore, the direction and velocity of horizontal flight.

delta hinge (flapping hinge): The hinge with its axis parallel to the rotor plane of rotation, which permits the rotor blades to flap to equalize lift between the rotor disc.

disc: An area swept by the rotor blades. Although the rotor in flight actually sweeps a cone surface, for purposes of calculations, it's customary to speak of it as a disc. This is a circle, with its center at the hub axis and a radius of one blade length.

disc loading: Similar to "wing loading" of a fixed winger. It's the ratio of helicopter gross weight to rotor-disc area (total chopper weight divided by the rotor-disc area). The greater the disc loading, the greater the craft's sinking

speed is with power off, and the steeper its angle of glide.

feathering axis: The axis about which the pitch angle of a rotor blade is varied. Sometimes referred to as spanwise axis. In helicopters, feathering axis usually is designed to go through the quarter-chord of the airfoil to minimize control-stick forces.

fixed pitch: The simplest form of rotor system; provides no means of varying main-rotor-blade pitch angle and depends solely on variations in engine throttle to control height of the helicopter. As a result, standard model-airplane radios can be used.

flare (flareout): A landing maneuver in which the angle of attack is increased near the ground; executed by helicopters as well as fixed-wing craft and birds, which consumes the kinetic energy of forward velocity to arrest the descent. In a correctly executed flareout, horizontal velocity and vertical velocity come to zero at the same time, making a perfect zero-speed touchdown.

flybar or stabilizer bar: A part of the rotor head that stabilizes the rotor blades. It also serves as a directional-control mechanism, transmitting control inputs to the rotor blades.

freewheeling unit: A component of the transmission or power train that automatically disconnects the main rotor from the engine when the engine stops or slows below the equivalent of rpm.

gimbal: A mechanism that permits the tilt of the rotor head in any direction, but restrains its rotation. If axis of tilt doesn't intersect the axis of rotation of a rotor, the gimbal is said to be "offset." A correctly designed offset gimball head allows the craft to fly hands-off for an unlimited length of time.

ground effect: The "cushion" of denser air confined beneath the rotor system of a hovering helicopter, which gives additional lift and thus decreases the power required to hover. It's the extra buoyancy near the ground, which makes the craft float a few feet off the ground on a pillow of air. Ground proximity does, in fact, increase the lift of a rotor to the height of 1 diameter above the surface.

gyro: A mechanical and electronic device mounted in the helicopter. It senses movement around the yaw axis and automatically applies tail-rotor input to counteract this unwanted movement.

gyroscopic precession: A characteristic of all rotating bodies. When a force is applied to the periphery of a rotating body parallel to its axis of rotation, the rotating body will tilt in the direction of the applied force 90 degrees later in the plane of rotation.

helicopter radio: A radio control with specialized mixing functions for helicopter use; usually ATS, adjustable pitch curve, high idle and throttle hold.

high idle: A selector throttle low-end-point adjustment. Usually set so that flying rotor speed is maintained when rotor pitch is all the way down. This function is useful in rolls and loops.

Hiller mixing: A rotor-blade control system providing direct control to the flybar that drives the main-blade pitch control.

mast: Main structural member of the rotor craft that connects the airframe to the rotor. In spite of its simple function, the mast must be *carefully* designed to minimize the feedback of damaging vibrations between the rotor and the airframe.

pitch angle: The angle between the chord line of a rotor blade and the reference plane of the main rotor hub or the rotor plane of rotation.

pitch curve: The relationship of the engine power to the main-rotor pitch.

retreating: Retreating blade is on the opposite side of the advancing blade. It travels with the wind created by the forward motion. If forward velocity of the craft is zero, and there is no wind, it's simply the blade opposite the advancing blade.

rigid rotor: A rotor system with blades fixed to the hub in such a way that they can feather but cannot flap or drag.

roll: Tilt of the rotor craft around its longitudinal axis. Controlled by lateral movements of the cyclic.

rotor: The lift-producing, rotary-wing part of the rotor craft. It consists of one or more blades and is correctly described as a two-bladed rotor, three-bladed rotor, etc. "Rotor blade" refers to a single blade only.

semirigid rotor: A rotor system in which the blades are fixed to the hub but are free to flap and to feather.

slip: The controlled flight of a helicopter in a direction not in line with its fore and aft axis.

solidity ratio: Portion of the rotor disc that's filled by rotor blades; a ratio of total blade area to the disc area. The ratio of total rotor-blade area to total rotor-disc area.

swashplate: A tilting plate, mounted concentrically with the rotor shaft. It consists of rotating and nonrotating halves, the rotating part being connected to the pitch horns of each rotor blade, and the nonrotating part to the cyclic. Thus the pilot can control the pitch of each blade while the rotor is turning.

teetering: Hinge and motion around it, in seesaw fashion, in two-bladed rotors. It allows one blade to flap up and forces the other blade to flap down. Use of teetering hinge allows direct transfer of centrifugal forces from one blade to the other, without going through the mast and separate flapping hinges.

throttle hold: A selector switch that uncouples the throttle channel from the left stick and holds it at a predetermined setting, so allowing the collective pitch to be controlled independently of the throttle. Usually for autorotations.

tip-stall: The stall condition on the retreating blade that occurs at high

HELI GLOSSARY

forward speeds.

torque: A force, or combination of forces, that tends to produce a counter-rotation motion. In a single-rotor helicopter, where the rotor turns counterclockwise, the fuselage tends to rotate clockwise (looking down on the helicopter). Anything that rotates and consumes power produces a reaction torque with a direction opposite its rotation. Tail (antitorque) rotors are added to helicopters to overcome torque produced by main-rotor rotation.

tracking: Tracking of the rotor is an operation necessary to ensure that every blade rotates in the same orbit. This means that each blade tip must follow the path of the preceding one. If not, a vibration will develop, which is similar to the dynamic unbalance of a wheel. To put a rotor "in track," the trim tab of the low blade should be bent up, and vice versa.

training gear: A flight-training device, usually consisting of two long dowels with plastic balls on the ends, crisscrossed and attached to the helicopter landing skids. This enlarges the machine's "footprint," so preventing tip-overs and damage.

transition: A narrow region of flight speed in helicopters when they slide off the ground cushion, before picking up the added lift of forward translation. The airflow pattern through the rotor changes erratically during transition and is often accompanied by roughness and partial loss of lift.

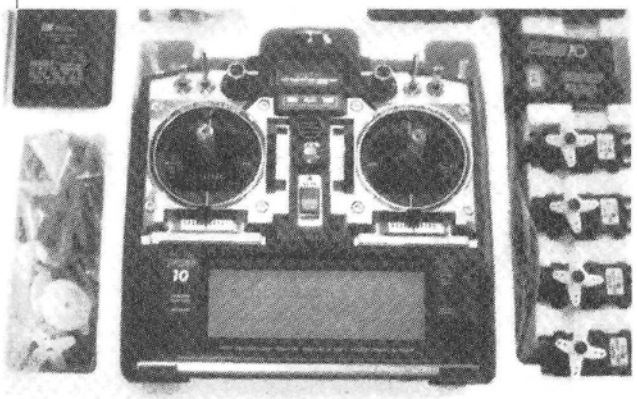
translational lift: The additional lift obtained through air speed due to the increased efficiency of the rotor system, whether it be when transitioning from a hover into horizontal flight or when hovering in a high wind.

yaw: Turning of the helicopter right or left around its vertical axis. In helicopters, it's done by changing the pitch of the tail rotor. ■

Helicopter Challenge

by CRAIG HATH

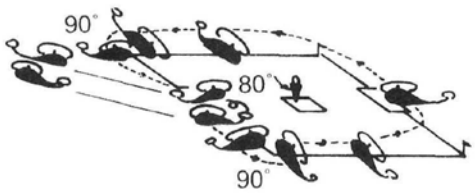
NOW THAT WE'RE in the heat of the flying season, other subjects seem to have heated up as well. Some radio manufacturers are offering systems with even more features, and all at higher costs. Some people believe that radio manufacturers are trying to add to the cost of the hobby. Others feel that these advancements will help the hobby grow by making it easier to set up, trim and fly our machines. But do our sets really cost more? Compare our basic 4-channel sets of today with the same sets that were available around 1970. To start with, most of our current "plain vanilla" 4-channel sets offer servo-reversing and dual rate for elevator and aileron; two features that weren't even available in 1970. The '70 series radio cost about $400 to $500, and today it costs about $150. If you consider inflation, we're paying around $85 to $90 in 1970 dollars. That's about a 700-percent drop in price over the years. Today, you can buy one of the very latest, fully equipped sets, complete with five high-performance servos and high-capacity battery packs for around $1000. If you consider inflation, this is still less than the 1970 4-channel set.



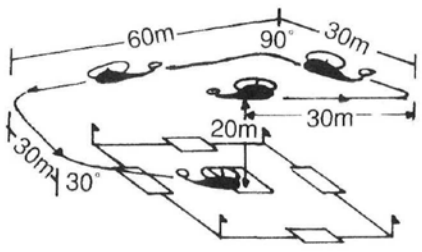
The new JR PCM is a prime example of the new technology that's storming the R/C industry. With all its features, the system will allow just about any combination of channel mixing, as well as five different collective-pitch curves. The system will handle seven different models, so the transmitter could be a one-time investment.

Other modelers I've heard from have expressed their concern about the "value" of all the additional features, which they say just aren't necessary. By focusing specifically on the helicopter radio system, we can study the evolution of the specialized radio. The early R/C helicopters were all flown using "standard" radio systems. As the capability of both the fliers and the machines themselves improved, it became more evident that some functions could be handled much better by electronic mixing, instead of mechanical linkage. In fact, some functions would be impossible to achieve by mechanical means. For instance, when the first collective-pitch machines began to appear, a second servo operating the collective was connected along with the throttle servo via a Y-harness. Any changes in throttle trim also resulted in collective trim, and vice versa. You had to be careful with every move you made trim-wise. To help compensate for engine torque, some of the early machines featured mechanical mixers that would add tail-rotor pitch along with throttle. These mixers worked fairly well, but they were often difficult to set up and trim.

Think about trying to design a mechanical mixer that would, at will, add or subtract throttle in relation to collective to achieve a true constant-speed rotor system like that of the newest radio systems on the market. Well, you *could* do it if you had a separate stick for each function, but the flying would get really busy! How would you get that really perfect pitch curve for autorotations or rolls without compromising the smooth hovering qualities of the



Shovel



Rectangular Approach

softer pitch curve used here with a mechanical mixer?

In an effort to remain competitive in a very tough industry, radio manufacturers are busy trying to give us the features that we're demanding. If the direction of the market really was headed towards more simplified, less expensive radios, then that's where the focus would be. We're lucky to be getting equipment at the current prices. Today's radio systems may turn out to be one of the hottest deals of our time!

Hovering Maneuvers

Last month, we worked on aerobatics that were a blend of basic maneuvers, while moving through forward flight. This month, I'll look at hovering maneuvers, and combination hover-and-forward-flight maneuvers. Unlimited combinations are possible when you consider the capabilities of the helicopter. It can go in any direction, stop and reverse that direction at will, and fly inverted. I want to go over a couple of the maneuvers outlined in the FAI *Sporting Code*. This code governs flying for all modelers participating in international competition.

The first maneuver in the schedule is the Hovering M. Quoting from the *Sporting Code:* "Pilot stands on outer helipad, model takes off from central helipad and climbs vertically to eye level, hovers briefly. With a constant heading, the model moves along a diagonal line to the left or right corner, hovers briefly. The model moves forward to the second corner, hovers briefly and moves sideways to the third corner, hovers briefly. The model moves backwards to the fourth corner, hovers briefly, and moves along diagonal line to central helipad. The model hovers briefly and descends smoothly to the helipad." (All of the flying is being performed around a 10-meter-square hovering area with flag poles at each corner, and a helipad located on line between flags one and four, and two and three, along with a helipad in the center of the square). Although this sounds like a simple maneuver, it becomes very challenging when you study the judges' guide for reasons to downgrade scores for the maneuver. Again, from the *Sporting Code*: "Points will be subtracted for the following reasons:

- Model tilts, turns or moves horizontally during the maneuver
- Model changes heading or speed during horizontal flight
- Model goes off course or fails to hover over the flags
- Takeoff and landing are rough
- Model doesn't land completely on the helipad
- Pilot steps off of helipad."

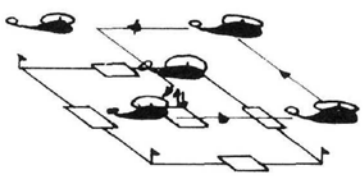
In order to avoid making all the control inputs visible to the spectators or judges, you'll need a lot of finesse to move the helicopter in each of the different directions. The helicopter must appear to glide through the "M" effortlessly.

Another tough maneuver from the *Sporting Code* is called the Top Hat. "The pilot stands at a fixed position chosen by him, the model flies at eye level 10 meters forward, straight and at a constant altitude. For a brief time, it hovers vertically above the outer helipad and starts a vertical climb of 2 meters. Hovers briefly; rotates slowly 360 degrees to left or right about the yaw axis; hovers briefly and climbs again for 2 meters; hovers briefly and moves forward for about 10 meters, at a straight and constant altitude until it's vertically above the opposed helipad, where it hovers briefly. It descends 2 meters vertically and hovers briefly; makes a slow 360-degree rotation about the yaw axis to the right or left; hovers again briefly; descends 2 meters vertically and hovers briefly. The model flies again at eye level 10 meters forward straight at a constant altitude. The direction of the 360-degree rotation during ascent and decent must be opposite to each other. Points will be subtracted for the following reasons:

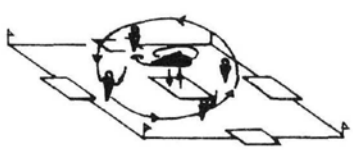
- The model doesn't fly horizontally or vertically in the described parts
- Altitude changing or horizontal deviation during the 360-degree rotations
- Deviations of the vertical plane of the maneuvers
- Brief hoverings aren't made at the described place
- The rotations aren't equal to 360 degrees, are irregular or aren't performed about the yaw axis of the model
- The 360-degree rotations are performed at different altitudes
- The rotations aren't performed in the described directions or aren't vertically above the helipad
- The described altitudes aren't respected
- The pilot leaves the fixed point chosen by him."

These two in-depth descriptions will give you a good idea of what is expected of the competition pilot. In the past, I've mentioned that all flying should have some purpose, if you intend to improve your

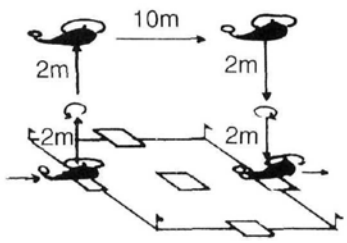
(Continued on page 123)



Hovering M



Pilot's Promenade

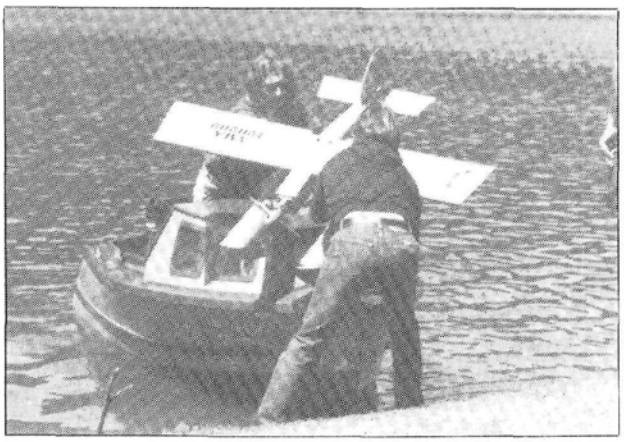


Top Hat

Floating Around

by JOHN SULLIVAN

Mike Johnson motors out to retrieve the author's 12-foot Runabout.



Myron Vandegraf reaches for George Graff's Dip Stick.

Wizard at rest (Lake Hennessy, May '88).

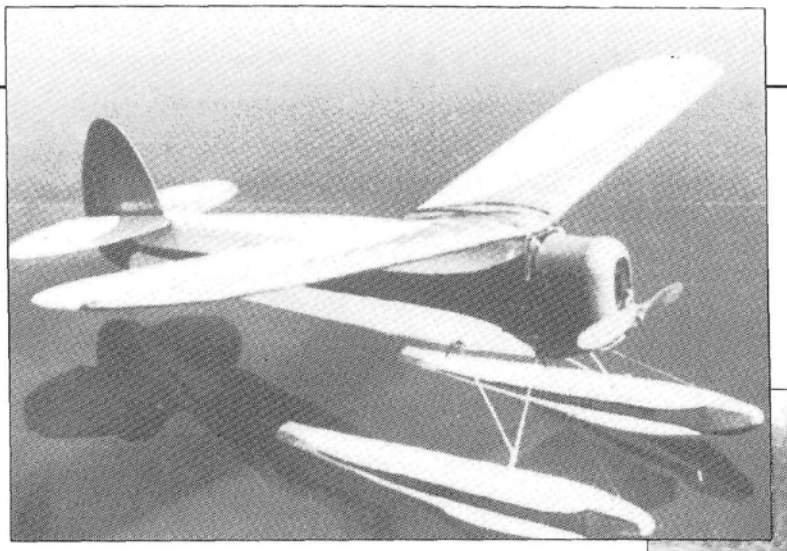
THE QUEEN OF the Hennessy Pontoons retrieval fleet, the Wizard, slid down the ways on May 7, 1989, and it *did not sink.* I must admit to more than a little trepidation as Mike Johnson and I eased six months' worth of spare time off the trailer, but we needn't have worried. The beamy little 12-footer sat right on its original water line and drew 15 inches at the bottom of the motors skeg. Under way, the boat had a really solid feel, with plenty of freeboard to make you think you're in a much larger craft. Top speed was about 26mph with two adults aboard, and it will stay on plane at half throttle.

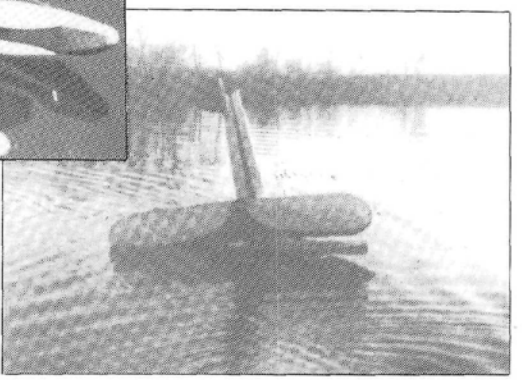
Wizard's hull is straight out of the '50s: It has a deep-vee forward, a 2x4 keel with lots of belly in it, and a bottom that transits almost to a flat section at the stern. Even in a hard, high-speed turn, it just digs in without cavitation or hopping. Totally rebuilding the boat and then running it has been a fantastic experience. A few weeks after its maiden voyage, my wife and I took Wizard out to Point Reyes National Seashore. With 1½- to 2-foot seas, 18mph winds, and spray in our faces, we were soaked to the bone and laughed like fools. This is one of those summers you hope will last forever.

Belated Goodbye

During the '89 Clearlake Meet, I took Ed Westwood and Paul Weston on a shoreline tour, and we happened upon an old Beech on EDO floats that had been flown down from Alaska for an annual. The cowl rings and nacelles were spread around the docks and we talked to the mechanic, who was straddling one of the radials, until he was distracted enough to drop a wrench into the water. We didn't want to test the guy's patience further, so we motored out into the bay and turned for one last look at the Beech. I believe we all had the same thought: There was one great symbol of the vicarious thrill we all share as floatplane modelers. Those radials will soon cough, sputter and settle into a rough idle, while the Beech's lines are cast off and stored. The cockpit door will be closed, and, with a little change in tempo, this marvelous blend of boat and plane will ease away from the piers, thunder into the sky, and wing its way back to Alaska.

When I returned home, I learned that Earl





Left: Bill Simmon's 1940's 60-inch old-timer on floats: free-flight at its daring best.
Below: Not all flights were successful. (See text.)

Dodge Osborn, the founder of the EDO Float Company, which bore his initials, had passed away late in 1988 at the age of 95. Mr. Osborn's contribution to aviation was enormous. Planes equipped with his floats opened up the Alaskan frontier, and they still service it today. Practically every type of plane that evolved during the Golden Age of aviation was equipped with these floats, and EDO is still the premier manufacturer of aluminum floats. The company has never stopped growing and diversifying. The first manmade object to touch the surface of the moon was a landing sensor manufactured by EDO Corporation.

Earl Osborn edited *Aviation Magazine* from 1924 to 1929 and helped establish the Institute of the Aeronautical Sciences. He will be sadly missed. In this age of design by committee, his individualism and drive may never be experienced again. We wish him scarlet sunsets, a gentle tail wind and safe harbors.

Old Time ROW

In *MAN's* first float issue, Rich Uravitch saluted the float flyers who had pioneered this facet of our hobby. One such person is Bill Simons Jr., who recently sent me a nice letter with pictures taken on Baseline Lake in Boulder, CO, of an old-timer on floats that he flew free-flight in 1941. The model was scratch-built from magazine plans of that era, and Bill "eyeballed" the floats. Bill reports that the 60-inch free-flight had about an 80-percent success rate on ROW and about 60-percent on landings. That's better odds than shooting craps, but you have to wonder what went through Bill's head every time he had a successful takeoff ("Where will it come down? Will I ever see the thing again? Am I going to *want* to see it again?")

My hat's off to you Bill, and all the other guys who braved the skies with no earthly ties. The pictures will give me something to think about every time I switch on my 6-channel Airtronics Radio.

Plat-1 Float Fly

I also received a nice letter from Bud Schwesinger* up in Sutherlin, OR, advising me of the 6th annual Plat-1 Float Fly. Bud asked if we could publicize the event, but with our bi-monthly schedule and required three-month lead time, it just wasn't possible. Perhaps the best way to handle this is to inform our readers of these annual events and rely on you to make a few phone calls to calendar your own activities. I've received pictures from previous Plat-1 Float Flys, and I can tell you this is a great meet. All of the events are low-key, and they have a women's taxi event (sounds great!) along with Saturday-night barbecues and free on-site camping. Contact Bud to see if you can get on the Umpqua Valley Modelers' mailing list. I know they'd love to have you.

Video Offering

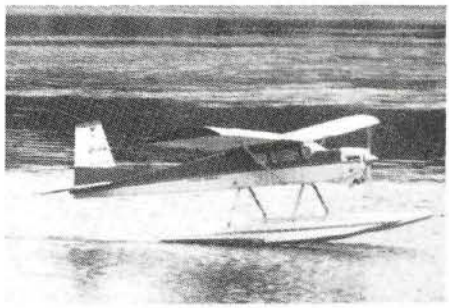
I have a complimentary copy of a new float video by Dick Robb* of Ketchican, AK. Dick has been the president of the Ketchican Rainbird Flyers since 1975. This is an all-float club, one of the first I've heard from, and I'm delighted to see what these guys are doing. This super video was shot at the last three invitational meets of their 1988 season. These people are serious! They usually arrive at a meet two days before the official start, and they don't leave until three days after! The video has absolutely fantastic footage of multi-engine floatplanes and amphibians, close in and expertly flown, but I enjoyed the view of the flying sites as much as the planes. You won't believe the grandeur of the lakes, mountains and skies. This video reeks of the rugged wild frontier. Man, how I'd like to go there someday! Dick plans to produce a video each year on fly-ins and related floatplane subjects. Give him a call.

As an aside, I'm interested in hearing from all-float clubs (the wave of the future?); I'd like to know how you became involved in float flying and what you're doing. Our club, The Hennessy Pontoons, was forced into float flying because we're based in the Napa Valley wine region and bare land is worth a minimum of $25,000 per acre, unplanted! Our last year on wheels, we lost three sites in four months. We've now had the same lake site for 4½ years. What a difference! Losing those three sites was the best thing that ever happened to us!

(Continued on page 98)

FLOATING AROUND

(Continued from page 97)



Bud Schwesinger's Double Eagle at '88 Plat-1 Float Fly. Twelve-foot span; 30 pounds; Quadra 50S.

Norseman Pic

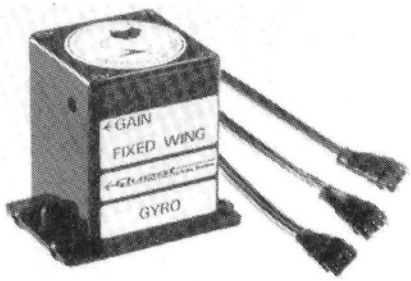
Our last shot this month is from Joe Murray of Unionville Hobbies*. Joe sent me this shot of his Noorduyn Norseman after our "Beaver Search" inquiry last year. We'll have a report on Unionville's fun-scale Norseman coming up next month.

By the way, this was the month that was supposed to be our special float issue, but we had to move over so *MAN* could celebrate its 60th anniversary. Did you know that *Model Airplane News* is one of the oldest, continuously published magazines in the United States? Quite a distinction! On behalf of modelers everywhere, I'd like to congratulate the DeFrancescos, the staff and the publishers for all those years of enjoyment, and, most important to me, thanks for giving float fliers the only regular float column in the modeling press. Next month *really* will be the special float issue. See you then!

Unionville Hobbies' 8-foot Noorduyn Norseman rests proudly on a typical floatplane "runway."

**Here are the numbers and addresses that are pertinent to this article:*
Bud Schwesinger, *Plat-1 Float Fly, (503) 459-3983.*
Dick Robb, *Ketchican Rainbird Flyers, (907) 225-3302.*
Unionville Hobbies, *P.O. Box 135, Markham, Ontario L3P-3J5 Canada.* ■

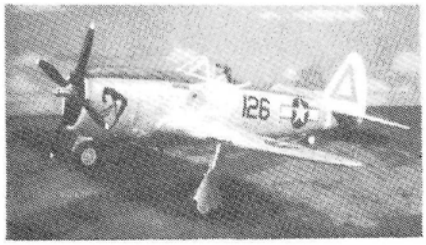
Product News



CENTURY GYRO SYSTEM

The Quest fixed-wing gyro system has been designed specifically for use in airplanes as a stabilizing device. It can be used coupled to the elevator, rudder or ailerons, or you can use more than one for complete control. Every plane should have at least one to fly better and more safely.

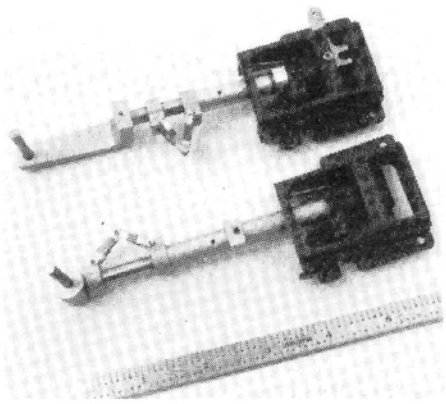
For more information, contact Century Systems directly at (714) 581-0107 or send $1 for their catalog to P.O. Box 868, El Toro, CA 92630.



BYRON ORIGINALS P-47 BUBBLE CANOPY

Ever since the Byron Originals' P-47 Razorback hit the market, the company has been deluged with requests for the Bubble Canopy version of the famous fighter. This variant features the usual high-quality hand-crafted fiberglass components for which Byron Originals has become famous. All panel-line detailing, surface markings and even cowl flaps are automatically reproduced in these pieces. Fire wall, engine former and tail-wheel former are all jigged into their proper fuselage positions and then glassed securely into place. The P-47 Bubble Canopy features the same wing construction as the Byron P-47 Razorback. Injection-molded, steam-expanded polystyrene beads provide unequalled strength and, at the same time, result in a superlight assembly.

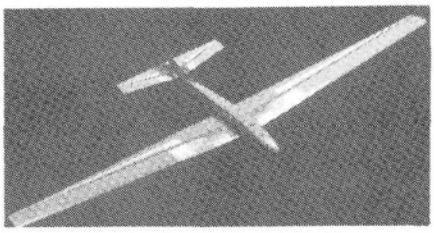
For more information, contact Byron Originals, Inc., P.O. Box 279, Ida Grove, IA 51445.



BVM MECHANICAL RETRACTS

Molded of carbon-fiber-filled nylon, these BVM Mechanical Retract units are very light and low in profile. The BVM Sabre jet created the need for this new retract system, but they have applications for many other models, both jet- and prop-powered. In addition to their low profile (less than 1 inch), their advantages include side actuation (which keeps the pushrod clear of the wheel), scale-looking drag-link operation, and the ability to accept scale-diameter struts. The nose gear is available in both a standard and a 90-degree twisting format. Retraction angle isn't critical, because the up-lock is provided by proper geometry of the actuating rods on the servo wheel. BVM recommends the Futaba 136G retract servo. The units are shown with the specially manufactured Impact Engineering struts, which are available to fit the Sabre, Aggressor II and the Viper.

For more information, contact Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708.



K&A MODELS MINI-I

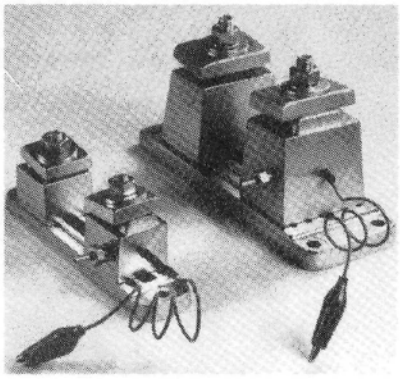
The Mini-I has a 28.5-inch wingspan, an area of 167.4 square inches and weighs 9.5 to 10 ounces. The kit includes all machine-cut plywood and balsa parts; foam-core wings; plans and instructions; hardware package and pushrods. Designed for the advanced builder and flier, the Mini-I requires a mini 2-channel R/C system.

For more information, contact K&A Models Unlimited, 5990 California Ave., Long Beach, CA 90805.

INVENTURE FLIGHT-TRAINING PROGRAM

Many modelers are discouraged by crashes and the difficulty of learning proper flight and safety procedures. Now there's a solution: InVenture, Inc. has developed a flight-training program that uses the latest graphics and video techniques to visually present training procedures such as "ground-school" and "in-flight" exercises, field etiquette and equipment check lists. This entertaining and informative program also includes highlights from the '88 Tournament of Champions.

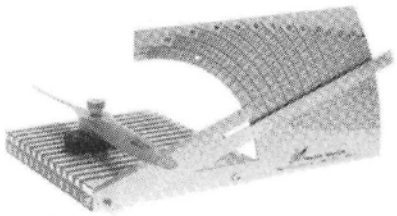
The emphasis is on safety; after all, you might as well learn it right the first time! The PFTP is the first in a series of professional learning tools for the new aeromodeler. Soon to be released is the Primary Advanced Flight-Training Program, which features advanced maneuvers and vital tips necessary to reach new heights in your flying proficiency. The program is accompanied by The Beginner's *Guide to Radio Control Sport Flying* by the AMA's Special Project Director, Douglas R. Pratt, and is published by Tap Books, Inc. It discusses flying and repairing all types of R/C planes, R/C frequencies, and it provides technical information. For more information, contact InVenture, Inc., 1137 W. 36th Pl., Suite 8, Los Angeles, CA 90007.



J'TEC ENGINE TEST-STANDS

The J'Tec's Safe-Start Engine Test-Stands allow you to start the engine without worrying about the glow-plug starter falling into the spinning propeller. For safety, the alligator clip is attached to the engine glow plug and the glow-plug starter is attached to the rear of the test stand, i.e., away from danger. This setup is ideal for 4-stroke engines with forward-facing glow plugs. The engine test-stand is made of cast aluminum, and it has adjustable engine supports, engine-restraining pins and heavy-duty pressure pads.

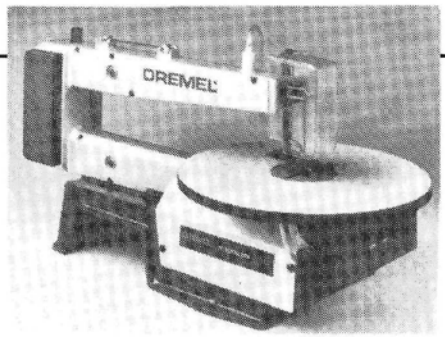
For more information, contact J'Tec, 164 School St., Daly City, CA 94014.



PRATHER PRODUCTS PROP PITCH GAUGE

A prop pitch gauge is a necessary tool for modelers who demand performance from their engines. Racers have long known the necessity of checking and truing props for maximum performance. With the increased demand for performance by pattern and sport fliers, they, too, can benefit from the use of a prop pitch gauge, which allows you to easily check or change the pitch of your propeller for maximum performance.

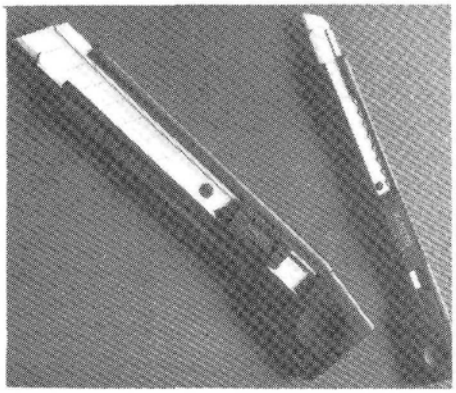
For more information, contact Terry Prather, Prather Products, Inc., 1660 Ravenna Ave., Wilmington, CA 90744.



DREMEL TWO-SPEED SCROLL SAW

To cut intricate, detailed curves, woodworkers need a powerful, sturdy scroll saw, and Dremel's new 16-inch two-speed Scroll Saw has enough power and durability for the most difficult cuts. The new Model 1671 features an induction, direct-drive 1/10-horsepower ball-bearing motor. The 3/4-inch blade stroke-cuts at 890 to 1,790 strokes a minute, depending on the motor speed. The saw uses either pin blades or straight blades, and it has convenient blade storage. The cast-aluminum, 12-inch, round slotting table provides workers with a large work base on which to complete a variety of projects.

For more information, contact Dremel, 4915 21st St., Racine, WI 53406-9989.



X-ACTO SNAP OFF BLADE

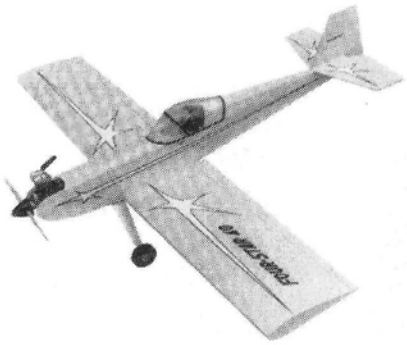
The durable new X-Acto Snap Off Blade utility knife features a safe and easy blade-storage and blade-replacement system that speeds up craft and hobby activities. A supply of sharp blades is stored in the handle of the cutting tool. The sleek knife's textured outer surface gives a firm, comfortable grip, and it's available in heavy-duty and light-duty versions.

For more information, contact: Hunt Manufacturing Co., 230 South Broad St., Philadelphia, PA 19102.

BONDHUS HEX-KEY SET

The BLX 13 provides all the most popular sizes of L-wrenches, including the 3/8-inch hex key, which is used in many industrial applications. The BLX 13-piece set (No. 10937) includes these sizes (inches): .050, 1/16, 5/64, 3/32, 7/64, 1/8, 9/64, 5/32, 3/16, 7/32, 1/4, 5/16 and 3/8. The new BLX-13 set is packaged in the patented Bondhex case, which identifies the tool sizes and locks them for storage.

For more information, contact Bondhus Corp., 1400 East Broadway, P.O. Box 660, Monticello, MN 55362.



SIG FOUR-STAR 40

Sig Manufaeturing announces the Four-Star 40: a sport aerobatic R/C ship designed to build fast and fly well. The model has a very simple lite-ply fuselage construction, an easy-to-build wing with spruce main spars, pre-cut balsa-sheet tail surfaces and a complete hardware package, including pushrods and Easy Hinges. With its light wing loading and durable construction, the Four-Star 40 is great for weekend sport flying or competitive fun-fly events.

For more information, contact Sig Manufacturing Co., Inc., 401-7 S. Front St., Montezuma, IA 50171.

The Freedom 20.™ Proof positiv

The Freedom 20's instruction booklet makes building easy—even if you've never built a model before.

Clear illustrations guide you through every step of construction and equipment installation. Covering materials and techniques are described, plus there's a section on adjusting and flying your plane.

QUINTE '89

(Continued from page 36)

K&B 7.5 engine—a perfect match for the 9-pound airplane. Even though the Skyhawk looks almost new, Art told me that it has at least 200 flights (further evidence of the durability of a well-maintained jet airframe). He conducts a comprehensive pre-flight inspection before every flight.

Charlie Lines fired up the twin Rossi .65s in his A3J-1 Vigilante and took to the air. The Vigilante took off after a short roll and climbed out with authority. However, as the model turned downwind, one engine threw a rod and Charlie was forced to land on the remaining engine. It was a thrill to see the "Viggie" fly again after all these years.

Dan Fish of Franklin, MA, flew a superbly finished Jet Model Products F-4 Phantom in Blue Angel markings. Powered by twin O.S. .77s with Dynamax fans, the 21-pound model handled the high wind with ease. Dan's Phantom included a well-detailed cockpit and a drag chute that was deployed on landing.

The real surprise of the weekend occurred when Eric Dainty of Kanata, Ontario, brought his Harrier to the flight line. Without much fanfare, Eric placed the Dynamax-powered model on the runway and then executed a perfectly convincing "ski-jump" takeoff. The Harrier accelerated with the jet nozzles full aft, then, as flying speed was reached, Eric vectored the nozzles down, and the Harrier leaped into the air. On numerous occasions, he was able to transition from near hover to horizontal flight. It was hard to tell whether the high wind was helping the model to hover, but it's clear that Eric was successful in duplicating the Harrier's flight profile. In the next few years, I wouldn't be surprised to see him demonstrating reliable V.T.O.L. performance with his Harrier.

Despite the weather, the weekend was a great success. With its smooth, obstacle-free runways, Mountain View Airport is a superb site for model jet operations. Judging from the number of participants and spectators, this event will continue to be a major date on the jet modelers' circuit. ■

AEROMODELING

(Continued from page 41)

pions" in Las Vegas, as the champs from the 17 districts were brought together to fly for the National Championship.

My experience as a regional indoor champion shows how well the Birdmen did all this. For one Championship, the 17 regional champs traveled by train to St. Louis, and we then traveled in *our own* Pullman car, which carried us to San Antonio and a blimp hangar. First-class facilities and flying, of course! Add a fine victory banquet, and you get the picture! All expenses paid!

The Jr. Birdmen operation lasted for a number of years; perhaps almost until the demise of the Hearst newspapers—the end of an era. It doesn't take much imagination to appreciate the value of the Jr. Birdmen to model aviation; the organization must have swelled our ranks considerably. It also accelerated progress; many of us joined as beginners and emerged as accomplished modelers with the experience gained.

Scripps-Howard newspapers jumped on the Jr. Birdmen bandwagon by providing sponsorship and event coverage, but their involvement was much less than that

of Hearst publications. Another helpful group was the Skelly Oil Company, which created a mythical Lindbergh-style leader called Jimmy Allen. They then designed some sport-style rubber-powered models, and they scheduled Jimmy Allen Air Races in which their designs would be flown. Many oldsters recall the fun of the Jimmy Allen races, even though the models' performances weren't exactly spectacular.

Getting Gassed!

The single most influential event in model aviation was probably the Nationals victory of Maxwell Bassett with an *engine-powered* model. At the time, there was considerable controversy: gas or rubber power? Rubber bands were no match for engines, however. Later, Bassett developed his revolutionary engine into something usable by us all, and for this, he deserves great credit. The AMA soon realized the problem and organized events for both gas- and rubber-powered planes, so dramatically broadening the scope of modeling.

Of course, Bill Brown with his Brown Jr. engine had us all visualizing fantastic flights! With his engine, he had only a short monopoly, as the market was soon loaded with Loutrels, Baby Cyclones, Atwoods, Ohlssons, etc., and this proliferation continued for many years. The gas engine led to another modeling growth spurt. Many aviation-minded people who had frowned on our rubber-powered "toys" liked engine power because it was more like the *real* thing. Through the '30s, the availability of gas power led to a steady growth in modeling, and the first examples of gas-powered remote-control models demonstrated the potential. Many years would pass, however, before R/C would become widespread.

I'm sure you've noticed that modeling has grown in spurts, with periodic plateaux in activity levels until another inspiring innovation comes along. Fortunately, growth has been steady, and a major reason for this has been the quality of the people involved and their devotion to the hobby.

Drawing the Line?

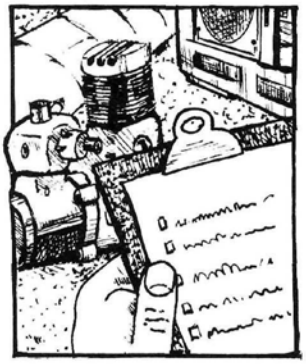
The next "spurt" came in the late '30s and it had a greater effect on modeling than anything that had come before it. The American Junior Aircraft Co. had been making the simple, ready-to-fly models so cherished by children; you know, the gliders and ROG things marketed through drug stores and toy shops, although the company did seem to carry it a little further, producing more sophisticated planes that appealed to adolescents. In fact, American Junior had been drawing newcomers into the hobby by providing millions of successful "toys."

The strength of A.J. lay in its flamboyant, innovative, inventor/modeler, James Walker, who concocted something that revolutionized modeling like nothing had ever done before!

At the time, free flight was our only way of flying, and to be an FF'er, you had to be part modeler and part athlete, because, once launched, the model had to be followed downwind if you wanted to recover it. More often than not, you had to *run* quite a long way! Unfortunately, this wasn't many aspiring modelers' idea of a good time! Jim was aware of FF's shortcomings and thought about some sort of *captive* flight—maybe even *controllable?*

It doesn't seem necessary to explain how Walker originated the concept of control-line models and developed "U-Control," but its first benefit was that it allowed us to fly in prescribed areas and to give up running! Another advocate of

(Continued on page 106)



Mini-Val

by JOE WAGNER

Takes a quick look at Vinylwrite Letters

Permanent lettering made easy

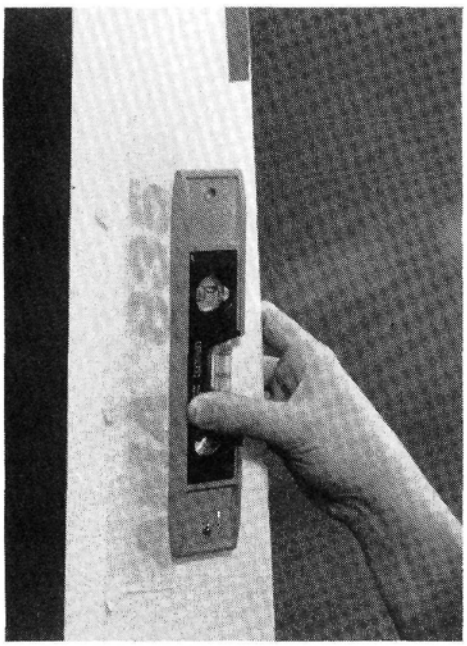
MY BIGGEST PROBLEM with Vinylwrite Custom Lettering* is deciding exactly what to order. The company's letters and numerals come in such a wide variety of styles, sizes, colors and other options, that choosing between them all is a tough job!

Vinylwrite offers 18 colors, characters ranging from 1/4 inch all the way to 1 foot high (in 1/4-inch increments) and 10 lettering styles. As if these options aren't enough (4,140 of 'em, so far), Vinylwrite also sells letters with expanded or condensed widths (anything up to 30 percent either way) and any angle of slant from zero to 40 degrees forward or backward. They have five-pointed stars, too, ranging from .25 to 12 inches, in all 18 colors! You can also get your markings aligned vertically instead of horizontally, or even in a curve. Reverse (mirror image) and negative (cut as open holes in the background color of your choice) letters are also available.

Vinylwrite's letters aren't decals, but individual characters of extremely thin (.002-inch) cast 3M vinyl. They're custom-cut by a computer to your specifications, and they're supplied pre-spaced and accurately aligned, exactly as ordered. You just have to stick them where you want them; anything smooth and rigid is suitable. And although applying letters to firm surfaces is quicker, they can also be applied to built-up structures.

Vinylwrite includes full instructions for applying the letters, and, if you follow them meticulously, I'm sure they'll work. The adhesive on the letter markings is *extremely* aggressive, however, and as soon as it touches a surface, it doesn't want to let go! So being something of a fumblefingers, I had to devise a slightly more foolproof method for applying Vinylwrite lettering to my models than the one suggested.

For built-up structures covered with doped fabric, iron-on film, and the like, I begin by thoroughly cleaning and drying the surface to which the markings will be applied, and then wetting the area with a weak solution of liquid dishwashing detergent and water, about one drop of detergent per pint. (The detergent/water solution permits easy sliding over the surface; it also makes the top tape translu-



PHOTOS BY JOE WAGNER

Left: A spirit level makes it easy to align markings on a wing with non-parallel edges. Here, the center rib rests on a level table, and the spirit level's bubble proves the Vinylwrite letters are aligned.

Right: Once the "sandwich" is properly located on the model, lift its lower edge and slowly and carefully remove the underside's protective film.

cent, which is helpful when it comes time to align the letters.) Next, I peel the transparent backing film off the three-layered "sandwich" and position the markings just where I want them—still attached to their upper carrier tape, of course. I then align the letters and "squeegee" the markings down smoothly and gently to remove as much liquid as possible.

I let this assembly dry just long enough for the upper tape to lose its translucency (about 1/2 hour). Then I slowly and cautiously peel back the upper tape; I begin at one end and pull the tape sharply back over itself. If any of the letters come off, I reattach them by pressing the sandwich against the surface (a ball-point pen works well).

When the carrier tape is off, I wait a day or two before continuing. (The vinyl material is practically airtight, and it takes quite a while for the water under the markings to evaporate.) When dry, I press the markings firmly against their underlying surface.

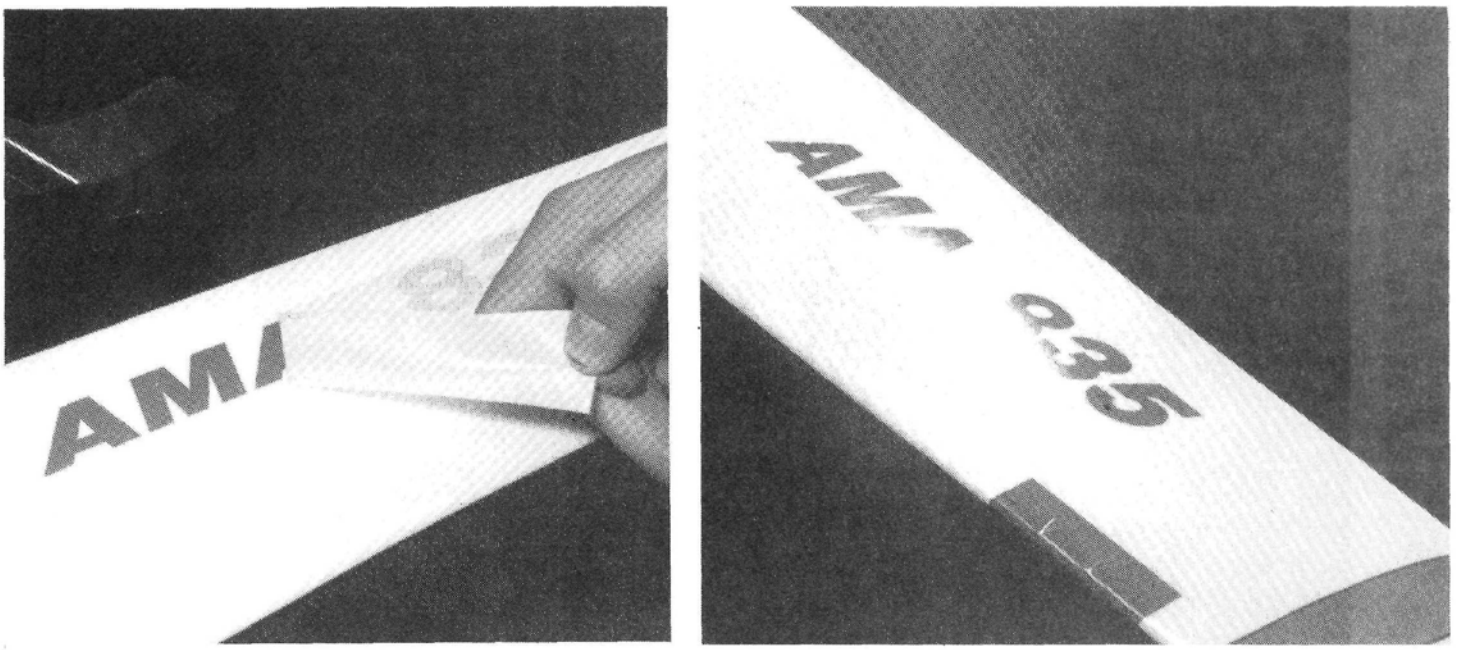
To apply Vinylwrite letters to a firm surface, I begin by trimming the transparent backing film exactly flush with the top edge of the sandwich. After thoroughly cleaning and drying the surface to which the markings will be applied, I position the sandwich just where I want it and hold it firmly in place with short pieces of masking tape stuck every inch or so along *only* the top edge.

Next, I lift up the bottom edge of the Vinylwrite sandwich (the masking tape acts as hinges) and slowly and carefully peel away the transparent backing film. If any part of a letter starts to come off with the film, I re-cover that letter with the film and firmly pinch the sandwich back together. That re-sticks the letter to its top carrier. I then continue to peel off the backing film. During this, I'm very careful not to touch the undersides of any of the vinyl characters.

After all the film has been removed, I *carefully* press the remaining layers of the sandwich against the surface. To prevent air bubbles and wrinkles, I press with a rolling motion from the top downward. Then I just burnish the letters down firmly (a marble makes a good tool for this), and I peel away the top layer. During this final part of the job, I pull the tape back over itself at a sharp angle to minimize the chance of pulling the letters off. If any of them start to come off, I stop, re-burnish, then continue to remove the top tape.

Tiny bubbles under the letters are nothing to worry about; they disappear by themselves in a day or so. Larger bubbles are also easy to get rid of; if they're near

(Continued on page 130)



Left: Peeling off the upper tape reveals that the vinyl letters are perfectly spaced and aligned on the model. (To avoid lifting the letters, the tape must be pulled back at a sharp angle, as shown.)

Right: As the reflected highlight plainly shows here, Vinylwrite letters are so smooth and thin, they seem to be embedded in the covering.

AEROMODELING

(Continued from page 103)

captive flying was Victor Stanzel, whose controlled models paralleled Walker's efforts. We still see toy versions of Stanzel's control-line models in toy shops.

U-Control came on the scene just before WW II, and the war might have limited it, as it did so many other activities. However, despite wartime restrictions, we could still go to a nearby school yard or park to fly, and there was no longer a danger of losing our irreplaceable models (to flyaways, anyway!). FF'ers had previously frowned on C/L as some form of plague, to be avoided at all costs, so WW II probably gave C/L a much-needed boost.

Control-line progressed steadily through the war, and by 1946, it was really flourishing. Established modelers had come to like it, and hordes of newcomers flocked to try it. WW II had focused everyone's attention on air power, and modeling clubs sprang up overnight. At its peak, C/L activity far outstripped anything we had seen before, and it continued to grow until the advent of R/C.

Onward and Upward?

Technological innovations were, no doubt, vital to the development of the hobby, but we must also remember the larger-than-life personalities who injected an exuberance that was, to most, irresistible. One of these characters was Jim Walker, who was said to have an ego that required the accolades that came his way during his "show off" modeling displays. Some said he was a latter-day Barnum or Ringling; in any case, he was modeling's greatest showman. Jim's constant country-wide appearances spread the news about modeling.

Can you imagine flying three C/Ls simultaneously? How about hanging a C/L on its prop in front of a crowd for several minutes and calling it a "Sabre Dance"? How about flying a C/L the length of New York City's Macy's parade? All this was routine for Jim Walker.

Later, with his R/C guiding three *power mowers* behind horses in Macy's parade, he produced the inevitable result! Obviously having a great time, Jim took it all in his stride, and his striking promotional displays brought modeling to everyone's attention.

Plymouth Patrons

Remember the Jr. Birdmen? Well, after the war, with C/L in full swing, the Plymouth Motor Co. established the Plymouth Aero League, which was basically the Birdmen all over again, but it drew many more participants because of C/L flying. In the larger cities, Plymouth dealers held regional meets that attracted considerable numbers, and the winners then went on to the Plymouth International in Detroit. The size of this event could be favorably compared with today's Nats, and entrants were sponsored by their local dealers.

To head the program and maintain liaison with the AMA, Plymouth recruited our AMA Director Russ Nichols, and for many years, the Plymouth International was a modeling highlight, often overshadowing the Nats. With excellent pro-style publicity, these activities drew great public interest, and thousands came to watch the daily flying.

The Plymouth operation had a few limitations: At the time, the *Russians* held most C/L world records. My friend Dick Wilson and I were therefore asked to attempt to establish new records at our

home-grown Internationals. This required all sorts of special facilities, which Plymouth provided exactly as we asked, and six or seven new C/L records were established, including ROW (rise off water). Suddenly, the Russians knew U.S. modeling was alive! In so many ways, the Plymouth Aero League was just what we needed, and the Plymouth Motor Co. did a first-class job.

Flying Fairs

Remember the contribution made by the Hearst organization? The *New York Mirror* and the *Philadelphia Bulletin* were also run by progressive people, and to take full advantage of public interest in aviation, they conducted yearly "Flying Fairs," which, for one frantic day, rivaled the greatest fairs. Actually, they were "madhouses" of activity, both for modelers and spectators!

Imagine, if you can, more than 1,000 entrants flying all categories of aircraft from rubber-powered FF, through C/L to R/C in one large airport. Ten to 12 C/L circles buzzed away while FFs soared overhead, and 10,000 spectators craned their necks as they tried to get a really good look at the flying. Add full-scale aerobatics, and you had a continuous spectacle that was a great day for model aviation. What would a flying fair be like today?

The Final Frontier?

After about 1937, R/C flights became increasingly feasible, although out of the reach of average modelers. The first R/C flights were little more than guided free-flights. From them, specialized designs to suit controlled flight were developed, and we even added engine control, which allowed predictable flight. Soon we were able to add operational controls of an elementary type, and what a thrill that was! You can't imagine the excitement of that first aileron roll and inverted flight!

While we were struggling with these rudimentary controls, the radio gurus were developing the ability to duplicate full-scale flight, and actually, it only took a few years for proportional control to reach us. We had finally found Utopia!

After 1937, R/C progress was rather slow for about 15 years. For one thing, an Amateur Radio Operator's license was required, and this was beyond the abilities of most modelers. In 1952, our AMA took the first step toward solving this problem by convincing the FCC that the hobby needed a license-free frequency. Of course, they've been fighting our battles for us ever since, and we now have few restrictions.

When the Citizens' Band became a reality, those of us who had long dreamed of widespread R/C flight expected to see our visions come true. Although our hopes of filling the sky with full-scale-like model aerobatics or racing around pylons would take many years to fulfill, those development years provided us with enough activity and excitement! Advancements and improvements came

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AEROMODELING

(Continued from page 107)

almost daily, the use of them giving us a sense of accomplishment that made us think the *ultimate* must be just over the horizon.

With the advent of R/C, many people with outstanding abilities joined our ranks, and so many contributed to the hobby that it would take a book to mention all involved. Once again, sharing information was a paramount need; *MAN* was there to help us, and Ed Lorenz became the Charlie Grant of R/C.

Model performance had taken a giant leap forward. Nothing happened overnight, but each milestone passed gave us a wonderful feeling of accomplishment. Twenty-nine years ago, the first R/C World Championship was held; we were *for real!* One can't really compare the first World Champ or pylon-racing performance with those we know today, because then, performing as expected required a hope and a prayer, but today, it's a question of scoring an 8, a 9, or a 10!

Some say R/C modeling has reached its peak, and it's difficult to dispute this, when you consider what's being done. Is there any form of flight that we don't duplicate with our wonderful models? From simple gliders, to P-51 fighters, to helicopters and even the most sophisticated jets—all are seen at our first-class flying fields. We've come a long way!

If we can do all these great things, which were only dreams a relatively short while ago, who knows what the future might bring? The greatest sport aviation people in the world are certainly not stagnated!

Of course, *Model Airplane News* was there when our "finest hour" began, and it's still here to help and encourage us. Who knows? Perhaps modeling's finest hour is yet to come! ■

BUILDING PLANES

(Continued from page 67)

$26, including shipping. The same amount of Sig's* Contest Balsa is one fourth that price. These materials aren't at all convenient to work with. The enclosed literature recommends forming "composite parts" by a vacuum-molding process. The tooling alone for something like an R/C sailplane wing would take *many* hours of precision work. Here's what Rohacell says: "Before construction of the wing can begin, molds must be constructed for the upper and lower surface of each panel. The wing panels are built-up of consecutive layers of reinforcing fabric and epoxy, then a layer of thin Rohacell foam (the 2mm works well) followed by a second layer of the same reinforcing fabric and epoxy. The layers are held tightly into the mold by sealing a layer of heavy plastic film over the mold and applying a vacuum so the outside air

(Continued on page 110)

BUILDING PLANES

(Continued from page 108)

pressure will maintain a uniform pressure over the entire surface. After the epoxy has cured, the shells are trimmed and fit with a spar and leading-edge structure. The wing shells are strong enough to completely eliminate the need for ribs, producing a wing that's light and extremely tough."

After reading all that, I think I'll stay with wing ribs!

As for the claim that Rohacell is stronger than balsa, their own figures prove otherwise. Sure, if balsa is loaded in its weakest direction (in compression across the grain), it's only about 50 percent as strong as Rohacell weighing half as much. But skillful modelers don't use balsa that way. Builders, like my 13-year-old bridge-contest winner, know enough to stress balsa *along* its grain. In that direction, it's superior to Rohacell by a very wide margin.

If you're looking for a "miracle modeling material" that's light, strong, easy to work with and highly resistant to breakage, give bamboo a try! It's one of the very earliest materials used in flying models: The Chinese have been using it in kites for over 4000 years. Bamboo is almost as springy as steel, at one-tenth steel's weight (and bamboo never rusts!). It's Nature's own thermoplastic, too. Heating it *(carefully)* with a hot-air gun or soldering iron softens it and enables fairly tight-radius bends. (That's how Chinese back-scratchers are made.)

However, bamboo has a few quirks modelers should know about. First, there are many kinds of bamboo, and few of them provide good model-building material. Ken Sykora's Old-Timer Model Supply* has the best grade: buy yours from him. Second, bamboo doesn't cut or carve well. It's easier to shape by splitting (on or close to its center line) or by scraping with a sharp-edged blade. Third, use only thin-viscosity glue for assembling bamboo, since it doesn't absorb fluids readily.

*Here *are the addresses of the companies mentioned in this article:*
Top Flite Models, Inc., *2635 S. Wabash Avenue, Chicago, IL 60616.*
Lone Star Models, *1623 57th Street, Lubbock, TX 79412.*
Superior Aircraft Materials, *12020-G Centralia, Hawaiian Gardens, CA 90716.*
Powermaster Products, Inc., *10103 Freeman Avenue, Santa Fe Springs, CA 90670.*
Composite Structure Technology, *3701 Inglewood Avenue, #268, Redondo Beach, CA 90278.*
Sig Mfg. Co., Inc., *401 S. Front Street, Montezuma, IA50171.*
Old-Timer Model Supply, *P.O. Box 7334, Van Nuys, CA 91409.* ■

GMP LEGEND

(Continued from page 79)

Stage 15 is used on other GMP helicopter kits and is normally part of the Bell-Hiller mixer, so don't be worried if there are extra arms or screws with this part. Simply discard these extra pieces; you won't need them on the Legend. Be sure that you don't over-tighten the carrier unit, as excessive torque can crack this plastic part.

At this point, switch to the rotor-blade construction manual. Assembly will be more accurate if you use a scale that weighs the blades to within 1/10 gram. If you have a High Point balancer, you should balance the rotor head before moving on to Stage 16. If the rotor-blade assemblies are complete, place them on the head and "high-point" this assembly, too. I like to be sure that the rotor head is balanced, so that the balance won't be affected when changing rotor-blade sets (provided the rotor blades balance properly).

Stage 17 discusses finishing and painting the canopy and tail feathers, for which I used K&B SuperPoxy paints. After the canopy halves are assembled and trimmed, wet-sand the entire exterior with 400-grit paper, being sure to dull all the shiny parts, including the tight grooves around the windshield area. Mask off the windshield if you aren't planning to paint over it, and be careful not to sand it. Don't use any primer over the plastic, as it will be roughened enough by the 400 paper to have plenty of "tooth" to which the paint can adhere. Use a tack-rag, be sure to spray in a dust-free area, and allow at least a day for each color to dry before you mask and spray on each trim color.

A good Superpoxy mix consists of one part A (paint), one part B (hardener) and one part thinner. Use the part B brushing gloss catalyst in hot weather, as it works more slowly and allows the paint more time to flow while you're spraying. I wish that GMP had included more photographs of the prototype helicopter or a drawing showing the intended decal positions. This is no big deal, but for people like me with no imagination, it would save time.

Move on to the controls set-up manual, and follow each step carefully. If you're confused by a control or how it works, take a break and review the manual. It's pretty good for getting all the rod lengths set and everything hooked up correctly. Since this machine is for beginners, GMP should have included a diagram showing correct servo-travel direction and the direction in which the controls should move. The control throws and centering were nearly perfect when set just as described in the manual.

There was no mention of the need to check for the helicopter's proper center of gravity (CG). I started by setting my Legend up with the CG about 1/4 inch in front of the main shaft. Flight tests showed that a little more nose weight would improve forward flight and rolls, and this led to a CG about 3/8 inch forward of the main shaft. Be sure you check this; your machine will be a lot happier if you do. Now let's head for the flying field, and look at how the Legend performs.

PERFORMANCE: Except for the negative pitch settings, I followed the directions for the pitch-curve settings given in the control set-up manual. Since I'm using the JR* PCM 10, I set the normal pitch curve for negative 2 degrees. The Position-One pitch is set for negative 7 degrees, and the throttle curve for Position One is set to move from hover at just above half throttle to full throttle with the stick all the way up or down. This allows

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GMP LEGEND

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the helicopter to be flown inverted without flipping switches, etc. It's like flying an airplane upside-down with just a few more things going on! Throttle-hold pitch-curve settings are negative 5 degrees to positive 13 degrees. I also set up the inverted flight system so that it duplicated the normal flight setup in reverse. To avoid damaging the drive cogs at both ends of the belt, before flying, make sure that the tail-rotor drive-belt tension is as tight as you can get it without binding the mechanics.

The powerplant for my Legend was the Webra* speed .61 ABC, using the Pro-Mix carburetor, and a Hatori* helicopter tuned-pipe set—a powerful, quiet combo! During the first flight, I checked the blade tracking that had been initially set up on the bench. No adjustments were required, so I set the remaining trims for hover and then adjusted hover pitch to get the machine in the recommended 1700rpm hover range.

When I had the helicopter hovering well, I began to evaluate its handling characteristics. I was surprised at how predictable the Legend was as it moved through slow hovering circles, slow forward and aft runs, and side-to-side movements. The steady hover itself is quite good, too. I had set up the dual rate as recommended, and I found that the low rate was slightly *too* low for my tastes. Actually, I thought that these settings would be too fast, but they weren't; the Legend handles hovers very nicely.

Before I get into its forward flight performance, I'll tell you that all the flight tests were conducted with a set of 178-gram rotor blades. Although this was 3 grams more than the recommended maximum blade weight, it was close enough. The second set of blades I built weighed about 166 grams, and these blades gave the Legend a little "wilder" feeling. The beginner will be better off with a set of blades at the top of the recommended weight scale, as there's a very noticeable difference between blades varying by just 10 grams.

Before the first tank of fuel was gone, I had the Legend up in forward flight and doing aerobatics. The Legend is a real hot-rod, and with Webra power, this machine *begs* you to try things with it. The Legend is great for learning aerobatics: Loops are as simple as pulling back on the stick and waiting for the machine to come through the bottom, and rolls drop slightly if the only thing you do is hold in the roll cyclic. For the more advanced, the Legend is capable of other manuevers, such as outside loops and snap rolls.

There's one flight characteristic that I *don't* like: The helicopter has a strong tendency to pitch its nose upward in forward flight. Although most R/C helicopters have this tendency, here it's the most pronounced I've ever experienced. I can live with this in forward flight, but I'd have to be extremely "on top" of the machine while re-entering hover from forward. The Legend constantly wants to come to a total stop on the glide path back to hover, but with some practice, you can get used to pushing forward cyclic to keep the Legend moving toward the target landing area.

I discussed this trait with my friend Steve Stuart, and he recommended that I mix some forward cyclic with collective pitch. With a little experimentation, I got the system set so that the helicopter hardly has to be flown at all on final approach. The mix is also "switch-selectable" on the

PCM 10 so that you can turn off the mix in flight for aerobatics, etc.

John Gorham told me that the Legend would be the best autorotating helicopter I'd ever flown, and I agree with him. My first auto was out of necessity; I was flying around inverted at about 40 feet when I ran out of fuel. I pulled the machine upright through half an inside loop and hit the throttle-hold switch to get the autorotation pitch curve. At this point, I realized that there was still lots of rotor speed, and I decided to fly the machine back to the runway. The Legend sat down like a butterfly with sore feet, and there was still rotor energy left over!

John also told me that the Legend wouldn't fly as well as a flybar-type machine in wind. I disagree here, as I've flown it in 30- to 35mph winds, and it handled just as well as any machine does in these conditions.

Overall, the Legend is quite suitable for beginners, if, for improved stability, they fly with the gyro and use rotor blades that weigh at the top of the scale. The sport flier won't find a helicopter that's flies more responsively yet is still fairly docile in a hover. If you want to push yourself to the edge of the envelope, try the Legend; you'll like!

**Here are the addresses of the companies mentioned in this article:*
Gorham Model Products, *23961 Craftsman Rd., Calabasas, CA 91302.*
Loctite Corporation, *18731 Cranwood Park, Cleveland, OH 44128.*
K&B Manufacturing, *12152 Woodruff Ave., Downey, CA 90241.*
JR; *distributed by Hobby Dynamics, 4105 Fieldstone, Champaign, IL 61821.*
Webra, *distributed by United Model Products, 301 Holbrook Dr., Wheeling, IL 60090.*
Hatori; *distributed by Hobby Dynamics.* ■

HUGHES BODY

(Continued from page 86)

large decals—the wide, rear, quarter stripes and the lower, front, black panels that represent foot windows—can be tricky, since they must be coaxed to follow the Hughes 500's curves. After excising a nasty air bubble with the knife after putting on an early decal, I tried cutting the large decals into sections so that a slight overlap would allow proper coverage of the curvy parts.

The instructions show the top panel covering the doghouse attached with double-stick tape. (Alternatively, two small, self-tapping screws can be used to fasten this part.) Reattach the stock tail boom *with* the drive wire, link rod, coupler, and t/r input gear, but *without* the

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HUGHES BODY

(Continued from page 113)

stock horizontal stabilizer, bracket, or tail case, so that the plastic tail-boom section can eventually be slid onto the regular boom. The regular tail-boom still does all the work, so make sure that the four mounting bolts are tight and that the ball-link set (No. 3037) is secure, because these parts are hard to reach when the landing gear has been bolted on.

When the mechanics are inside the body, you'll see that the windshield opening makes the radio equipment very accessible. Any of the five servos or the gyro can be replaced while the side frames are still attached to the fuselage. Although you can't pull the engine without taking out the mechanics, you'll be able to remove or service the rotor head, main shaft, swashplate, mixer/washout unit, main gear and linkage levers just by taking off the windshield.

Two holes near the top allow the fuselage to be secured to the stock Concept 30 canopy mounting posts, but with regular bolts instead of knurled screws. Injection-molded brackets fastened to the bottom of the side frames position the body and the landing-gear struts.

The rear pair of struts is attached to its bracket with self-tapping screws, and you might want to use bolts and blind-nuts if you remove and install the mechanics more than a few times. Aligning and bolting the struts, body, brackets, and mechanics calls for an extra pair of hands, since there's almost no room for a wrench, and the bolts must be driven through four small access holes in the bottom of the fuselage. Have someone hold the mechanics and the body sideways while you hold the landing gear and tools.

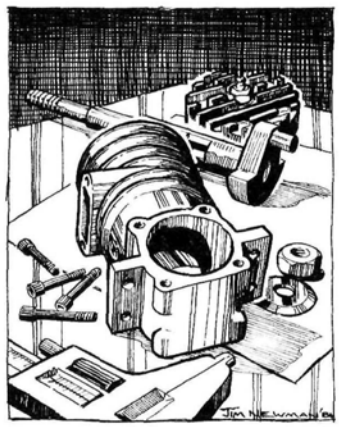
The LG supports in the kit are an accurate rendition of the tall, faired Hughes 500 struts, but don't try the famous Ed McClane squash test that demonstrates the resilience of the stock Concept 30 landing gear with this bird.

Slide the OHS tail-boom section over the aluminum tail-boom and onto the joint at the body; it's a very good press-fit. Check that the drive wire is engaged with the forward coupler by rotating the counter gear (No. 3024), then reassemble the tail-rotor gearbox around the metal boom, the input gear and its bearings. Attach and trim the T-tail. The vertical stabilizer has a sturdy wire tail skid molded into place. Re-install the tail-pitch lever (No. 3044) on the control rod and tail case.

The Kyosho Hughes 500 was ready after just a couple of evenings' work. I'm very impressed with the quality of the molding, the accuracy of its shape, the ease of cutting openings and the thoughtful design. The flexible plastic fuselage promises to be slightly more forgiving of hard landings than fiberglass bodies are. The self-supporting nature of the OHS material (no wood formers needed, even at the window pillars) results in a light scale helicopter. The difference in weight between this and a stock Concept 30 comes to just a little more than the weight of an additional canopy. The Concept 30 in its new clothes still weighs less than pod-and-boom .30-size collective machines.

I've spoken to several pilots about this kit's potential for more detailed scale finishing. They've suggested several methods for preparing this new blow-molded plastic for painting. David Carter (whose nicely airbrushed Concept 30 canopies were on display at the Toledo Show) and Jack Schreyer recommend using an automotive primer of the type used in painting flexible bumpers. Great Planes representative Tim Lampe tells us to roughen

(Continued on page 123)



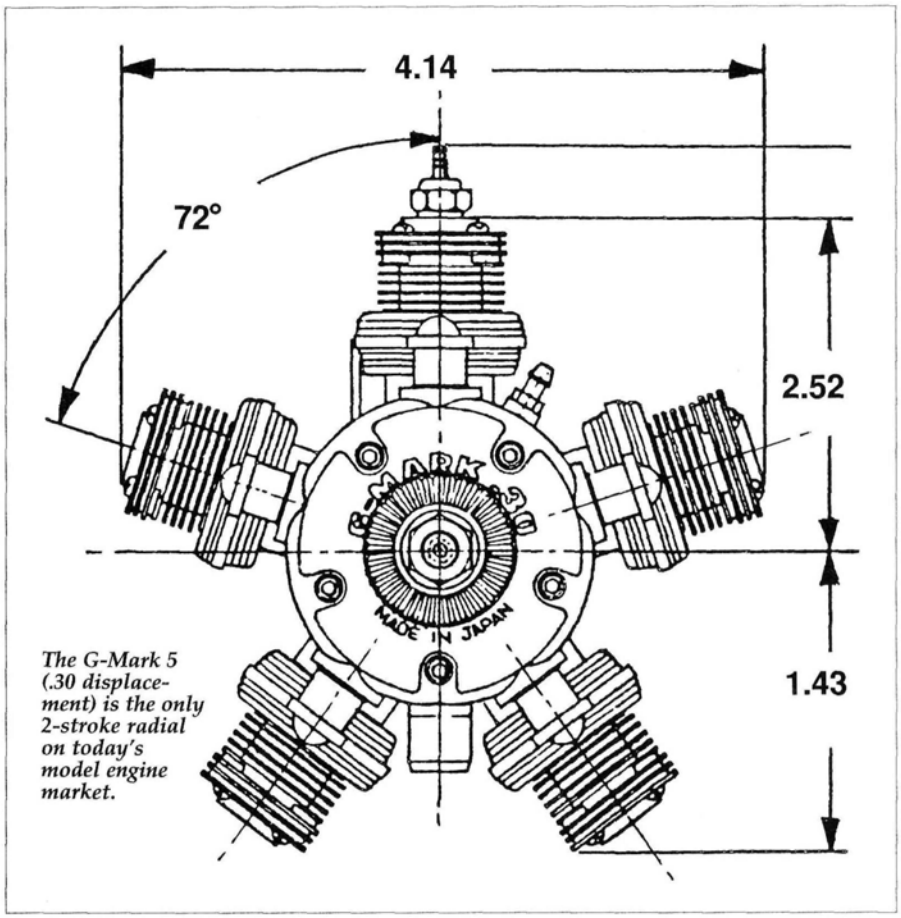
About Those En

by JOE WAGNER

I'M NOT SURE what it is, but there's something about "round engines" that has always had particular appeal to us airplane modelers. Over 50 years ago, miniature radial "dummy motors" made of celluloid were popular hobby-shop items. They were bought by thousands of model builders to adorn the noses of their rubber-powered Curtiss Hawks, Stinson Detroiters and Gee Bee racers. And for a quarter of a century, my old friends the Williams Brothers*—Granger and Larry—have been making beautifully rendered plastic reproductions in various scales of yesteryear's famous radial airplane motors: Pratt & Whitney Wasps, Wright Whirlwinds and Le Rhone 9-cylinder rotaries.

Plastic scale-model engines like this add much realism to the appearance of R/C Stearman PT-17s and Boeing F4B-1s. Still, these motors are only dummies, and, most of the time, the single-cylinder engine that actually provides the power for flight shows all too plainly. What we scale airplane model enthusiasts have always wanted are realistic-looking miniature radial engines that *really work.*

Surprisingly, operational model-airplane motors of this kind have been available intermittently since as far back as 1910! Beginning then—and continuing until the early 1930s—several companies in Europe and the USA manufactured radial-type multi-cylinder *compressed air* motors. The majority of these were 3-cylinder; but 4-, 5-, 6- and even 8-cylinder motors were made and advertised for sale. (To learn more about this subject, read Bert Pond's new book, *Expansion Engine Powered Model Aircraft.* It's complete with plans and patent drawings for several of these motors, so you can build them yourself. The book is available from Hannan's Runway* for $17.95, plus $2 postage.)



The G-Mark 5 (.30 displacement) is the only 2-stroke radial on today's model engine market.

The first commercially made internal-combustion, radial, model-airplane engine was the Morton M-5. It was designed by G.R. Morton during World War II, primarily as an educational project for high-school machine shops. In 1945, it was offered for sale: first as a machine-it-yourself casting kit; later in the year as a complete ready-to-run engine.

The Morton M-5 was a 2-inch = 1-foot scale adaptation of a full-size aircraft engine: the 1936 LeBlond (taken over in 1938 by the Rearwin Aircraft Co. and renamed Ken Royce). This engine weighed 220 pounds and put out 85hp at 2125rpm. Its 1/6-size miniature had a displacement of .92 cubic inch, weighed 22 ounces and developed possibly a quarter of a horsepower at 3500rpm.

The M-5 was a highly ingenious model engine, and it's still prized by collectors today. (Unfortunately, a recent attempt to manufacture replicas of it—by a namesake of mine—ended in failure.) However, as a powerplant for flying model airplanes, the M-5 turned out to be an utter dud. It was heavy: With mount, coil, batteries and prop, it came to almost 2 pounds. Yet the M-5 developed less power than a .60 of the same era weighing half as much, ready to fly.

And was the M-5 ever fragile! Too much of it was made of die-cast aluminum. The M-5's ringless pistons, con-

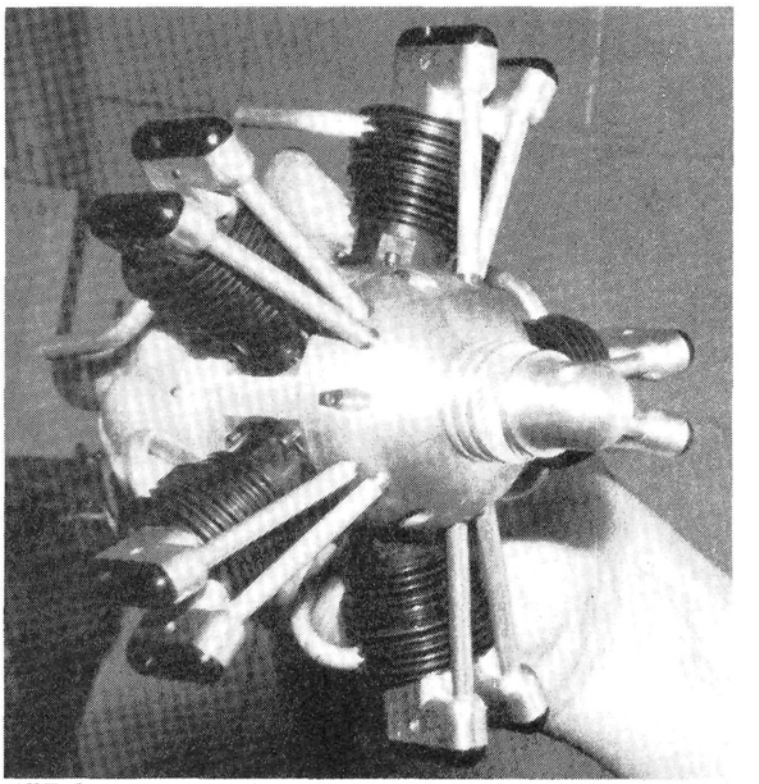
necting rods, tiny rocker arms and carburetor housing—all were 17S aluminum (sometimes called pot metal). This alloy is almost soft enough to scratch with a fingernail, yet nearly as brittle as a pretzel. Because of its inferior materials, even a fairly gentle crash landing could ruin an M-5.

The Morton (and later Burgess) M-5s were 4-cycle engines, of course. Two-cycle radial motors (e.g., the G-Mark* 5) usually amount to separate single-cylinder engines geared to a central propeller shaft. This configuration is necessary because 2-cycle motors need "crankcase compression" to provide *vacuum* for drawing the fuel-air mixture into the engine, as well as *pressure* to force this fuel-air mix into the cylinders as the motor runs.

However, in 1960, a man named Werner manufactured at least a few 2-cycle, 5-cylinder radial model engines with a single crankshaft and no gears. At .245 displacement (five .049-size cylinders), it was probably the smallest "Radial 5" ever offered for sale. Unfortunately, it didn't run well. Its secret—and major weakness—was its slide-valve induction system. Each cylinder had a "transfer chamber" on the other side of its piston, opposite the head, sealed off from the crankcase by a thin, steel, rectangular "slide valve." This had a slightly elliptical hole in its center that was just big enough for the connecting rod to pass through.

The Werner's conrods had circular cross sections, of course. As the crankshaft turned, the rods' oscillation moved the slide valves back and forth, uncovering an inlet passage in each cylinder's transfer chamber on the upstroke, and closing it off again on the downstroke. It was a clever design and deserved more success than it had. With further development, the Werner radial engine might very well have become a truly practical model powerplant.

Antique documentation: This is a set of 1944-vintage machine-it-yourself drawings for the famous Morton M-5 model engine.

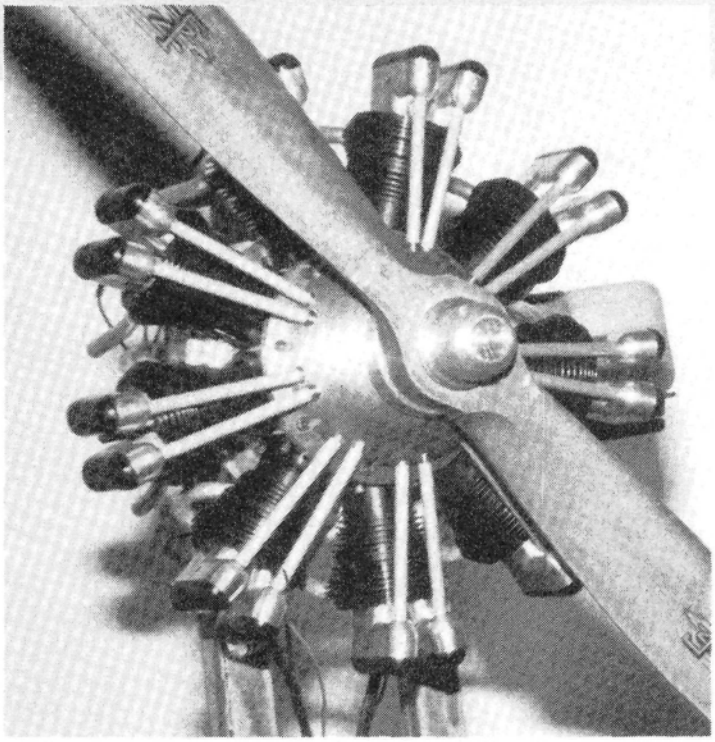


All Technopower engines have aluminum cylinders with hard chrome-plated bores. Typical of the 1/6-scale radials, this "5" has a 6-inch diameter, a 1.4-cubic-inch displacement, and weighs 26 ounces.

Nowadays, we R/C airplane enthusiasts have several round engines from which to choose. The previously mentioned G-Mark 5 is a good one. At .30 displacement, it's the smallest on the market—and also the simplest, because of its 2-cycle design. While not particularly scale-like in appearance, the G-Mark has a good power output: about 12,000rpm full throttle (3500 at idle) on a Top Flite* 9x4 with 25-percent nitro fuel. Its 4 1/4-inch o.d. (neglecting the glow plugs) makes it just right for, say, a 1.25-inch = 1-foot Fleet Trainer. (That would be a real hot dog in the air, with a .30 pulling 320 square inches of wing. Flying one of these would be all kinds of fun!)

Another Japanese-made radial 5 is the O.S.* FR5-300. It's *big:* some 4hp of output and almost 5 pounds of weight put it in the giant-scale class of R/C powerplants, *for sure!* Unfortunately, its price tag ($1,800 list) must limit its appeal to modelers. But the FR5-300 is one

ABOUT THOSE ENGINES



Although it's difficult to tell in photos from a full-scale radial "9", this 9-inch-diameter Technopower "C" Series 9 puts out over 3hp, has 4 cubic inches of displacement, and weighs 73 ounces.

mighty impressive piece of machinery! I have yet to see one running, but O.S. engines have enviable reputations, and I'm sure that the radial 5 is just as well-engineered—and performs as reliably—as any other O.S. motor. *[**Editor's note:** It sure does; check out the Project PT-17 by Nick Ziroli in our June '89 issue. RAU]*

My own choice for the best multi-cylinder radial model engines is the Technopower* line. They're American-made, have an extremely realistic appearance, and they're available in a wide range of sizes and cylinder numbers. Technopower makes 3-, 5-, 7- and 9-cylinder engines—and their 7s and Big Bore 5 are even available with spark ignition.

I've been intrigued by the Technopower motors for some time and recently visited the factory to learn about this company and its products. The business office is in a suburb of Cleveland, but the assembly plant is several miles away, just outside the rural village of Newbury, OH. The company is owned and operated by Elmer Lohmolder, who personally assembles and test-runs the engines. (Elmer isn't an airplane modeler himself, but a highly skilled tool-and-die maker. His background is a lot like Roy Cox's was, and Elmer has the same talent Roy had for extreme precision and ingenuity in motor manufacture.)

The Newbury plant isn't impressive in size, and not much metal-cutting takes place there. However, Technopower is a far bigger operation than it appears at first glance. Nearly all of its engine parts are made by subcontractors. Automatic screw machine shops, investment casting foundries, plastic injection molders, precision spring winders and aluminum electroplating/anodizing companies are all involved in Technopower engine-part manufacture. Building motors this way enables Elmer Lohmolder to spend most of his time actually working on engines, rather than supervising a large number of employees.

The Technopower engines are derived from a scaled-down version of the British Armstrong-Siddeley Genet engine of the late 1920s. The Genet was a 5-cylinder, 100hp radial noted for reliability. (It had one distinct peculiarity, which the model version fortunately does not: The Genet was designed to be mounted with one cylinder pointing straight down, in contrast to the usual arrangement of one cylinder positioned vertically upright.)

Technopower offers full technical and

(Continued on page 132)

Golden Age of

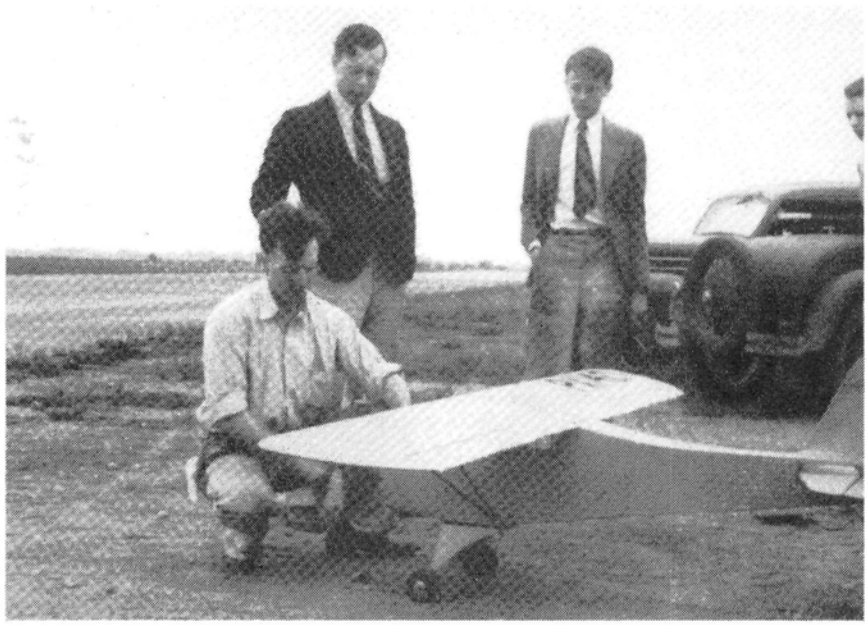
by HAL "PAPPY" deBOLT

GOOD NEWS from the "Vintage R/C Society"! Joe Beshar says it's off and running! John Worth has accepted the job of first chairperson, and Art Schroeder will edit the newsletter. This is such good work on Joe's part and such prestigious leadership! As membership grows, there's bound to be extensive action, so why not consider becoming a charter member while there's still time?

Purdue Project

This month, I'll complete the Purdue project discussion. Last time, I described the Purdue XP-1/4 original design and said that it proved itself in flight, so it was a likely candidate for the *first* 1/4-scale R/C. The Purdue objective was to compare the XP-1/4 performance with a known plane—a 1/4-scale J-3 Cub.

The photos of the Purdue Cub show a model that's *very modern* in most respects. At a time when rudder-only was winning the Nats, the J-3 used a four-frequency R/C system providing rudder, elevator, aileron and motor controls! Power came from an Avion Mercury 3/4hp engine, which was the largest model engine available in those days. Flying weight was a respectable 19 pounds: 1 1/2 pounds for the engine; 5 1/2 pounds for the receiver and batteries; 2 pounds for actuators and their batteries—a total of 9 pounds for equipment alone! Considering that materials were heavy in those days, they sure did well to bring in the Cub frame in at 10 pounds!



Starting the Avion Mercury 3/4 hp engine for another flight with Purdue's Cub "trainer."

Nineteen-thirty-eight Purdue 1/4-scale J-3 Cub with full controls (!) and 19 pounds of flying weight. Note antenna taped to wing trailing edge.

The Cub project had three objectives:

- To obtain flight data that could be compared with that of other designs
- To be a "trainer" (they had much to learn about flying)
- To serve as a test bed with which to evaluate their R/C systems

If they could meet these objectives, they'd have the necessary foundation on which to build the more sophisticated research on the XP-1/4. They did report successful flights with the Cub, noting that it seemed underpowered with the Avion engine (if you could call a flight that included a crash landing *successful!*—they never *did* learn how to land!).

The Purdue report concludes with a mention that another model of the XP-1 was under construction. This would be an even more ambitious project with a projected flying weight of *800 pounds*, and it would be powered by converted industrial engines. What vision! There's no indication whether this project was ever completed, but they do say that they'd have to learn how to land before flying it!

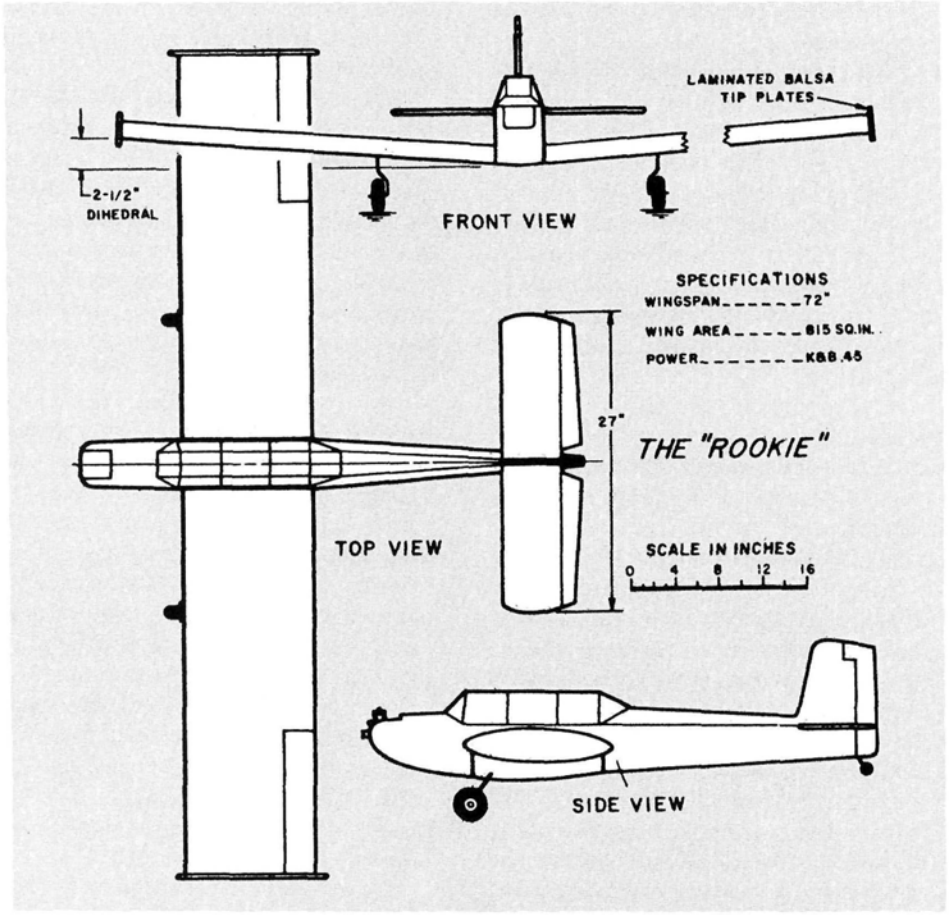
Finally, their report indicates that Purdue might have laid the groundwork for what became the successful "reed-style" and motor-powered servos. A careful scrutiny of actuator photos reveals the use of electric motors and "leaf-style" switches to control them. While they don't seem to have been "unitized," their action would have been similar to that which

Rockwood used much later. The main difference was that Rockwood had two channels available for each servo while Purdue had only one. We must assume that they still used a *sequence* (as with escapements) to obtain control action. An automatic neutral was also included, and this would have been another giant step forward at the same time.

I hope you can appreciate what an ambitious and visionary project this was, at a time when R/C was only in its infancy. It seems to have initiated many of the basics of R/C, including giant scale, which didn't become popular until years later. In retrospect, it seems too bad that the knowledge gained through this work wasn't made public, because the Purdue findings could have considerably hastened the growth of R/C! I'm obliged to the *Buhlmans* for the chance to discuss it with you!

More Mundane Matters

So often, I mention something that jogs your memories, and since your input is vital to "Golden Age," please tell me about *your* recollections. For example, during a recent discussion, I mentioned that when *someone* won the Nats with a Sampey system, it was a great boon to Sampey sales. That brought a prompt response from old friend Clarence Lee, now of Sunland, CA.



Bill Winter's Rookie '60 multi-trainer. MAN feature article.

The South's Jim Kirkland and his '64 Nats-winning Beachcomber. Sampey propo radio and O.S. .46-powered.

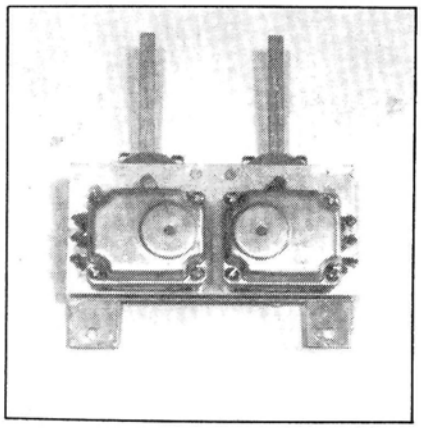
Clarence tells us that the time was 1964, and Jim Kirkland won the California Nats with a Sampey system. This was during the vintage era, according to the Vintage R/C Society (VRCS) categories, so the model involved would be a fine example of a vintage design. (It should do well today!) Jim's success illustrates the "rise of the south" in pattern competitions of the '60s, as he was, undoubtedly, one of the early "southern stars," and he made a remarkable impression on everyone who knew him.

Clarence writes that Jim won the '64 California Nats with the Sampey system, and this was a great accomplishment. Realize that in the '60s, the foremost pattern competitors were predominantly Californian, and Jim pulled the trick in their own back yard! Jim called his Nats winner the "Beachcomber"—a name that could describe its origin. Jim thought the design was a good compromise: He picked the best features of the foremost pattern birds of the time. (Note its resemblance to Kraft's Quick Fli and the L.W. Viscount.) At the Nats, the Beachcomber was powered by an O.S. .46, and it later used one of the new-on-the-scene Lee .45s. (Can you imagine the improvement in performance with the Lee jewel?) The radio used was a "swampy" Sampey and, as you might have guessed, the win didn't hurt Sampey sales one little bit! This might have been the *first* Nats win with a

propo system. (Remember that the early '60s were still dominated by "reeds"—the days of Kazmirski and company. Also, very few top pattern fliers took the plunge into analog proportional, preferring, instead, to wait for the arrival of digital.)

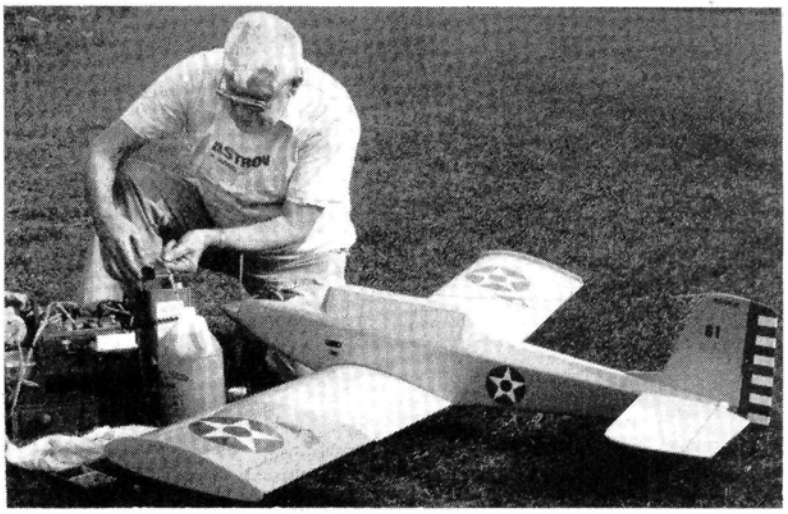
Radiating enthusiasm, genial Jim came out of the South and showed considerable contest ability. During his all-too-brief life, he was a gold mine of advanced, practical, fine-performing pattern designs. Unfortunately, while helping a friend re-roof his house, Jim had a fatal heart attack. I've never had a finer long-distance friend than Jim Kirkland, and I hope that someone who was closer to him has more to tell us about Jim's doings. His success showed other southern modelers the path that they subsequently followed to R/C fame.

One of the top manufacturing companies of the time was Gil Henry's Veco Corp. These people got into R/C early and produced outstanding kits (the White Cloud comes to mind). Clarence Lee has never had a production company (hope I'm right, Clarence!), preferring to stay in



Motors and gear trains used for actuators by Purdue. Required limit switches were separate and mounted on airframe. First servos?

development and custom work. With the success of his fine .45 engine, however, there was an obvious need to mass-produce his engine designs, and Clarence joined forces with the Veco Corporation. The result of their collaboration was a series of engines that made a major impression on early R/C. Perhaps Clarence will share the complete story with us sometime? Anyway, his connection with Veco led him into preliminary work that eventually led to Jim Kirkland's Beachcomber being marketed as a Veco kit. The fact that the plans showed a Sampey ra-



Old pro Winter prepares modern Rookie to test for FAI pattern capabilities. Showed exceptional "in-box" performance. Photo by Tom Schmitt.

dio obviously added even more to Sampey sales. This is another example of how early equipment sales were greatly influenced by contest wins and kit recommendations—much more so than today! Clarence tells us he had a Sampey system that had to be returned to the factory, and that was the last of that! (Still has the instructions!)

For their contributions to the sport, Jim Kirkland and Clarence Lee are honored in the AMA Hall of Fame, and this tribute is well deserved. (I think Jim lived to enjoy the honor.)

While on the subject of possible vintage designs, I'll pass on some info that the mentor of OT R/C and *every* modeler's friend, Bill Winter, was kind enough to supply. To understand this one, first remember that today we have "trainers" for almost every possible phase of R/C, and when we want to try something new, there's usually something available at the entry level. This wasn't always the case!

Bill was editor of *MAN* for nearly 10 years (one of the longest reigns of them all!), right in the middle of the R/C explosion, so he knew about every major advancement, all the way from rudder-only to full-house proportional.

Like the other *real* OTers left today, Bill began modeling with rubber power (his scale rubber-powered planes are classics), then he moved on to gas engines and eventually into early R/C. Bill would be the first to tell you that because of his family brood, he could only barely afford the cost of R/C and had to make do with the simplest equipment. Nonetheless, he made great strides in aircraft development and became a most accomplished pilot. Later, when others were flying with multi controls, Bill was able to join them with cascaded compound escapements added to his venerable single channel. With this experience, he learned what multi-control flying was all about, and when he eventually had a multi system, he was well aware of what was needed for entry into full-house flying. For instance, he realized that compared with single-channel crashes, multi crashes were disastrous; he also knew that expensive reed systems were easily destroyed. His common sense (a great attribute of Bill's) told him that a special aircraft designed for easy transition would be best for him and was badly needed by other modelers.

Much thought went into the desired design, and, looking back, the influence of the docile-flying Astro Hog is apparent in the plane's appearance. Bill felt that the relatively high speed of the average heavy multi designs made them difficult for beginner multi fliers to handle and increased crash damage. Thus, two basic characteristics were necessary: lower flying speed and lighter weight.

To fly more slowly, Bill's design had an ample wing area and a thick, symmetrical airfoil. Lightness was achieved with a simple layout and structure. Aerodynamics was taken into account to produce ultra stability without detracting too much from maneuverability. Other configurations might provide these features more easily, but low wings were "the thing," so the wing had to be on the bottom! As is so often the case, the use of these parameters resulted in a plane that looked so fundamental that it could certainly be called ugly, but the addition of a T-6-style canopy suggested its trainer purpose and created a distinctive appearance.

Never mind its appearance! What about its *performance!* This was some-

(Continued on page 138)

HUGHES BODY

(Continued from page 115)

the OHS surface with fine steel wool; his results were seen on the yellow Concept 30 Jet Ranger displayed at the Los Angeles Hobby Show. Another method is suggested by *Model Helicopter World* scale columnist Jerry Hicks, who suggests using a light-grade Scotchbrite kitchen cleaning pad to abrade the Kyosho white stuff before priming and painting.

I wonder what talented scale helicopter champions like Steve Mintz or Jack Dunkle could do with this kit? Kyosho's innovative blow-molded fuselage around a proven set of mechanics makes possible some very attractive small (.30, not .60) scale flying.

**Here are the addresses of the companies mentioned in this article:*
Kyosho; *distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.*
MonoKote; *distributed by Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616.* ■

HELI CHALLENGE

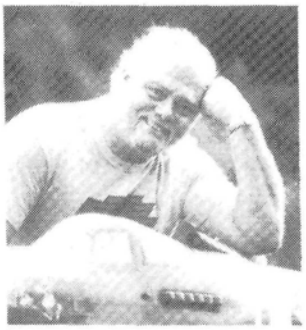
(Continued from page 92)

flight skills. It's fine to occasionally put in a relaxing flight where you're doing nothing but the same simple tasks, but the sport flier who wants to expand his capabilities must constantly challenge himself. Mixing forward flight with hover requires a lot of practice for flying to look intentional and disciplined.

Some other challenging maneuvers that mix most flight elements have been dropped from the FAI schedule:

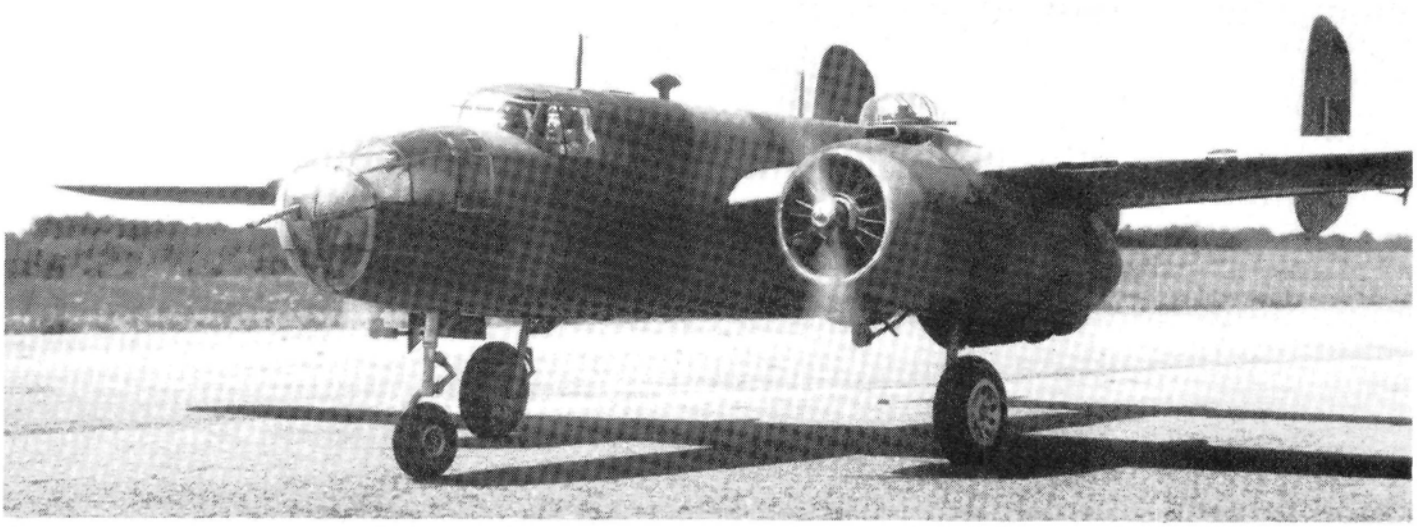
- The Rectangular approach. The model starts at around 20 meters above in the center of the helipad, moves forward 30 meters, turns 90 degrees, moves for 30 meters, turns 90 degrees again and moves forward for 60 meters, turns 90 degrees and moves forward 30 meters, turns 90 degrees, all the while descending to a landing back on to the helipad.
- The Shovel. This is a great exercise if you can fly nose-in. The pilot stands in the center of the square, facing the model, which has an altitude of 20 meters. The model begins a slow descent of 45 degrees towards the outer helipad directly in front of the pilot, stops, hovers at eye level, flies

(Continued on page 130)



Sporty Scale Tec

by FRANK TIANO

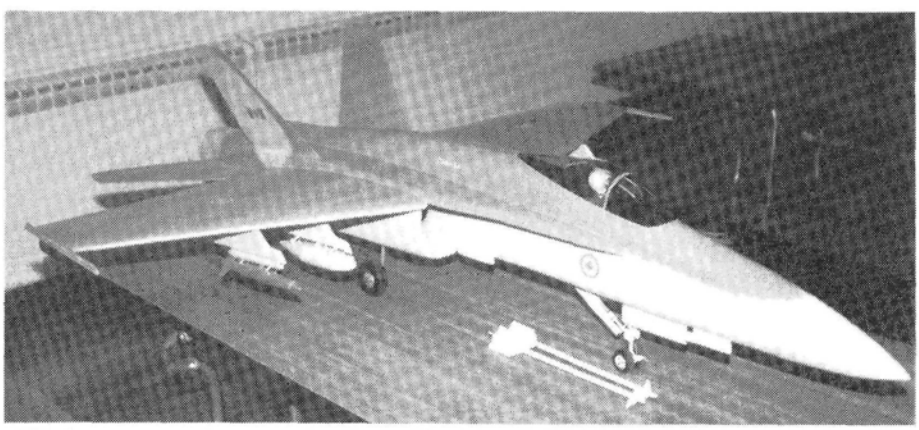


Beautiful "glass-nosed" (not Russian for "openness"!) B-25 built by Bill Steffes from Nick Ziroli plans taxis out for its first flight. Twin G-23s literally sang. Great flier!!

BOY, DO WE HAVE a lot to talk about this month! As I sit at the computer, I get the feeling that Stunning will probably turn this into a two-part article! This month, I'll feature some of our readers' work, offer some industry news, show a couple of gadgets and explain a technique.

Let's start with a comment about my good friend from the state of Washington, Mr. Bert Baker*. Bert recently sold three of his best-selling designs to Yellow Aircraft* and, by the time you read this, he'll have started on three brand-new projects. The P-38, P-47 and the Zero are out of the picture for the time being, while waiting in the wings are a 86-inch Helldiver, a 72-inch RV-4 and a 92-inch Vultee BT-13. For more information, give Bert a call. He just loves to talk airplanes!

Another buddy from the West Coast sent me a picture of his new Bob Holman* Corsair—a blow-up of Bob's very successful 60-inch model. A super model builder from Southern California, Shane Cramer, tried a new color scheme for the old bird, and I really think he's hit on something. The Royal Navy color scheme of pale bluish-gray looks great on the model. Since Shane's wife, Janet, is from England, the British color scheme satisfies the whole family!



This beauty started out as a Parkinson Blue Hornet. With just a little "cosmetic license," some imagination and a bit of work, Tim Farrell produced a very acceptable-looking F/A-18 Hornet ducted-fan jet.

Next are a couple of airplanes from Dr. Timmy Farrell. His modification of the Parkinson Blue Hornet, although slight, adds a whole new dimension to the model and certainly enhances its F/A-18 look. Tim simply rounded-off a couple hundred corners, made a rounded fuselage top and applied a scale color scheme. The finished product looks far superior to the normal slab-sided kit version. In fact, it could probably do fairly well at local contests. Tim also sent a couple of pictures of an almost-completed P-61 Black Widow that he and Lee Henderson are building. This scratch project has a 60-inch span, is powered by a pair of O.S. 25s and weighs a bit under 6 pounds! This is just a fun-scale airplane; in fact, it's retractless. Tim hails from Kingston, NY, and is a frequent WRAM show winner.

Another old friend, Bill Steffes, also

niques

from New York, has finally flown the Ziroli* B-25 he's been working on for over a year now. Bill made the trip from his hometown of Schenectady all the way down to Ziroli territory (Long Island) for the maiden flight. Weighing in at 33 pounds and powered by a pair of Zenoah G-23s, the B-25 Mitchell was captured on film by none other than our editor himself. The 15-knot wind was not of any concern as Billy handed the transmitter to Nick Sr. and turned his back! "Tell me when it's over," he cried. But the old master didn't let Billy down: The '25 made a majestic takeoff, a beautiful scale-like flight and a perfect landing. Bill says it could have used a tiny bit more oomph, so for the next flight, he's going to replace the 15x6 props with a pair of 15x8s. As I said recently, there's much to be said for these gas engines, especially in the reliability department!

Here's a couple of doodads I recently discovered in the Ace R/C* catalogue. Actually, there are tons of gizmos in this catalogue, but you'll just have to order your own copy to get the full effect of what I'm talking about! Anyway, Ace offers the Chargemaster, a battery charger that charges two transmitters and four receiver packs at the same time. And better yet, the unit can be ordered so that it charges up to three 1200mAh receiver batteries along with one regular 500mAh pack. Or you can have two and two, or three and one, the other way, or all four can be 500mAh and so on, and so on, and so on! Another great feature of this contraption is that once you've charged your batteries overnight (or overday, if you work third shift), you can simply flip the toggle switch to convert the thing to trickle-charge and leave the batteries on the unit indefinitely! This way, you're ready to fly anytime the mood strikes! Best of all, you can save $10 off the $59.95 price tag by buying the unit in kit form.

The other Ace product that caught my

eye is their Digipace battery cycler. Yes, I know that anybody worth their weight in microballoons should already have a battery cycler, but I know for a fact that many of you still don't! This unit is absolutely loaded! We're talking serious features here: everything but power windows and cruise control. The Digipace is a sophisticated piece of equipment that will remove any memory from your battery packs or your mother-in-law, and it will cycle the same batteries and then tell you how much flying time you can expect from that battery pack. It comes assembled or in kit form, will charge at 20 or 50mAh, or 50 and 120mAh, if you're using bigger packs, and you can get it with or without a trickle-charge feature. Best of all, its $89.96 to $139.95 price range makes it almost as affordable as going to your favorite fast-food place with the wife and kids!

Tech Tip

My technique tip for this month deals with how to apply panel lines to your scale model. Well, there are three ways to do this, but first you must decide what effect you're looking for and how serious you want to get. For instance, a Top Flite* P-51 intended for a fun-scale contest or general sport flying might not require that you devote a few day's work to panel lines. On the other hand, a full-blown Byron* Corsair or Thunderbolt almost demands that the lines look authentic. With this in mind, here are a few ways to accomplish this feat.

The absolute easiest way to apply panel lines to your model is with a carpenter's chalk line! Just stretch the line from point to point, make sure that it's very taut, and pluck the magic twanger. Depending on your color scheme, you may have to change the color of the chalk, but that's no problem: Simply buy a pack of multicolored chalk and you're all set. Yes, the lines do fade a bit, especially in gusty conditions, but they can be applied over and over. You can even change the color to fool your friends into thinking you have a new airplane!

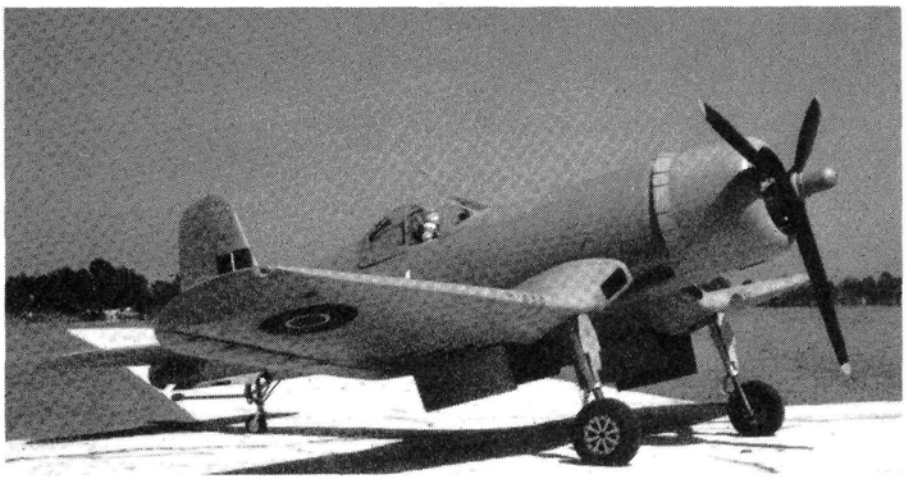
The next best way to apply panel lines is with a long, flexible ruler and a black or brown crayon. This method is a bit more time-consuming, and the fuel residue does tend to make things a bit messy after a day's flying, but at least the lines look good for a while. Once again, color changes are a snap. For the more serious modeler, I suggest using a Rapidograph pen and ink, followed by a clear coat of some protective paint, or, believe it or not, a Sharpie pen, which works great.

For those of you who want real, nochidt, panel lines, determine the width of the panel line, go to your favorite art supply store and buy some drafting tape in that size. With a soft pencil, draw the various lines all over the model. A flexible ruler (also available at art supply stores) really comes in handy here. Oh yeah, mark on a surface that has one *very light* coat of color on it. Next, lay down the drafting tape and use a *sharp* razor blade to terminate all ends. *Do not* allow the tape to pass over another piece of tape at junctions. After the entire surface is panel-taped, you can proceed in one of two ways:

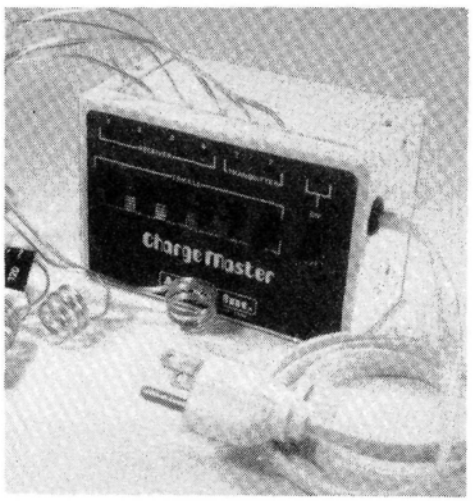
- Apply light coats of paint to the model and paint your markings. The panel lines will have a nice appearance and the build-up of the paint will keep them adhered to the surface for a very long time.
- Apply three or four light coats of paint over the areas that have panel tape only. Remove the tape, lightly sand the areas with 600 wet paper and finish spraying the model. The resulting fine panel lines indented in the model's surface might appear more realistic than the raised type in the first method. In all cases (possibly other than the crayon method), I think you'll be quite pleased with the results.

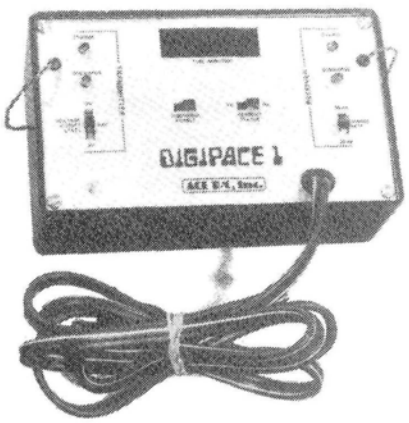
Top Gun

I thought I'd close this month's column with a bit of Top Gun News. First of all, the rumors about having ten Team Scale invites for the 1990 event are true. To be eligible for an invitation in Team Scale, you must do one simple thing: Send a brief letter to FTE stating the builder of the aircraft, the pilot, the type and size of aircraft and any unique features you think will sway the decision of the Board of Directors. Remember: This is a serious scale event with a stringent rule book. In other words, a reasonable facsimile of a



See? All Corsairs are NOT blue. Unusual grey/blue color chosen by Shane Cramer for upsized Holman F4U. Nice to see variation. Seventy-six-inch span; 26 pounds; Moki 2500 power.





Left: Ace Chargemaster unit allows simultaneous charging of up to four receiver packs and two transmitters. Just the thing for the active flier!

Right: Battery maintenance is probably the most overlooked part of R/C sport, so Ni-Cd battery cycler might be the best piece of insurance you can buy for your radio. Ace makes a complete line of items to help.

B-24 Liberator, spanning something around 15 feet and weighing 90 pounds just ain't gonna cut it. Besides, you can't operate that puppy safely off a 515-foot tarmac anyway! As you know by now, Mike Kulczyk really whacked his F-105 at Top Gun, but he still received the new Futaba 1024 radio for the Critics' Choice award. Well, Mike has decided to build a brand-new Thud for the contest circuit, and he's promised us pictures of it as soon as it's ready. The new one will have the same Viojett* fan system, but this time Mike is opting for the new KBV 82 engine.

Rick Lewis* couldn't compete at Top Gun, but he brought along his almost-finished Skyraider anyway and put it on display. Well, I'm here to tell you that kits are now ready from Rick. You may contact him after 5 p. m. California time.

A number of guys at Top Gun had odd-size wheels or tires that I hadn't seen before. After some investigation, I discovered that many of these tires, and some struts, too, were purchased directly from Byron Originals. For years, there's been a rumor that they would only sell stuff to people who purchased one of their kits—not true! If you have the cash, they have the stash! Call or write for a catalog: You might be surprised at some of the stuff you can get for that new big bird! At Top Gun, the 4th-place finisher received a $200 gift certificate from Byron, and you know what he did with it? Right, he bought a set of landing-gear struts!

I'd like to share with you five very important dos and don'ts associated with scale modeling: Never glue in your fire wall with Spray Mount; never exceed an 80-degree climb-out angle immediately after takeoff; the Wright Flyer had no CG, so don't try to build and fly a model of one; always remember that your scale-modeling savvy is directly proportional to the number of pens you carry in those little plastic pocket liners; and never, ever, forget to check that six!

**Here are the numbers and addresses that are pertinent to this article:*

***Bert Baker,** Scale Flight Models, 11023 38th Dr. SE, Everett, WA, (206) 337-0868.*

***Yellow Aircraft,** 3040 Palston Rd., Suite 201, Mississauga, Ontario, L4Y 2Z6, Canada.*

***Bob Holman Plans,** P.O. Box 741, San Bernadino, CA 92402.*

***Nick Ziroli Models,** 29 Edgar Dr., Smithtown, NY 11787.*

***Ace R/C,** 116 W. 19th St., Box 511C Higginsville, MO 64037.*

***Top Flite Models,** 2635 S. Wabash Ave., Chicago, IL 60616.*

***Byron Originals,** P.O. Box 278, Ida Grove, IA 51445.*

***Viojett;** distributed by Bob Violett Models, 1373 Citrus Rd., Winter Spring, FL 32708.*

***Rick Lewis,** 714-597-1966.* ■

HELI CHALLENGE

(Continued from page 123)

sideways either left or right, hovers and turns 90 degrees away from the pilot, performs a 180-degree nose-in circle, hovers and turns away 90 degrees, and ascends going away back up to the 20-meter height.

• Pilot's Promenade. This is a real challenge. The model stands perfectly still at an eye-level hover, while the pilot walks in a circle completely around the helicopter! Use your imagination and create your own maneuvers. Have fun and keep challenging yourself.

Hyatt Helifest

I received a report from David Hyatt on the Hyatt Hobbies' annual Helifest. Held this past Memorial Day at the Phoenixville, PA, YMCA athletic field, this event is really growing, with over 100 helicopters present. David sent me several pictures taken at the event that show some of the most beautiful helicopters in the country. Events included a forward and backward dash, three-ring pick-up, limbo eight and a three-balloon burst. There were also some flight demonstrations conducted by various manufacturers' reps, and over $1700 in prizes were raffled off. Another Helifest will be held around Labor Day, and if you want to join in the fun, contact Hyatt Hobbies, Marchwood Shopping Center, Route 100, Exton, PA 19341 (215) 363-2070 for details.

That's about it for now. Next month, I'll take a look at autorotations. ■

VINYLWRITE

(Continued from page 105)

an edge, squeegee them in that direction until they're eliminated; if they're in the middle, pierce them at one edge with a needle, and then press out the trapped air through the needle hole.

Vinylwrite letters are pretty much fuelproof as is, but if they're likely to come in contact with synthetic oil from model engine fuel (either the raw stuff or exhaust residue), it's safer to protect them with an edge sealing of fuelproofer.

Trim MonoKote, Coverite Graphics and a variety of readily available Mylar striping tapes have simplified dressing-up our basic colored models. Vinylwrite provides the same easy dress-up when numbers and letters are needed to further "personalize" our treasures!

Because Vinylwrite markings are cus-

(Continued on page 132)

VINYLWRITE

(Continued from page 130)

tom-made, they aren't available from dealers and must be ordered by mail. The company's proprietors, Art and Cynthia Morgan, tell me that they usually ship out completed orders within a day or two of receiving them. You can hardly ask for quicker service than that!

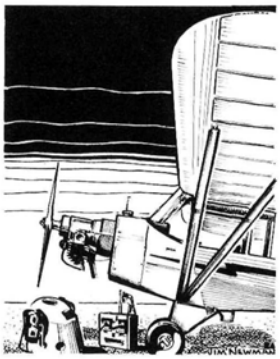
**Here's the address of the company featured in this article:*
Vinylwrite Custom Lettering, *16043 Tulsa St., Granada Hills, CA 91344, (818) 363-7131.* ■

ABOUT THOSE ENGINES

(Continued from page 118)

price information on all its motors in a magazine-size brochure, which is available for $3. This includes a reprint of a *MAN* engine test report on the Big Bore 5, with data on size, weight and power output, along with construction materials and design characteristics. I haven't space to recapitulate all of that here, of course; I'll have to content myself with sharing

(Continued on page 138)



Giant Steps

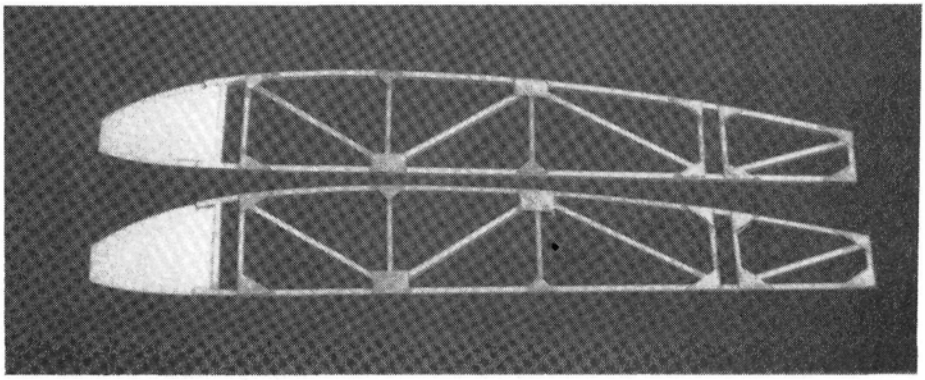
by DICK PHILLIPS

LIKE LAST MONTH, I'll continue with some rather neat ideas I've used over the years, hoping that you'll find them as handy as I have.

Several years ago, I visited Col. John A. de Vries in Colorado Springs. We'd been corresponding for some time, but had never met, and when we did, we hit it off right away. We've since become good friends and are partners in ViP Publishers, Inc.

The Col. is a scale modeler of considerable skill and, when we met, he was working on a model of the Ryan Brougham, which resembles Lindbergh's Spirit of St. Louis. It's a large, very well-detailed model, and the Col. is still working on it. He's made significant progress since I last saw the model, and the wings are now covered. The landing gear has received much attention lately and, when completed, will be a duplicate of the original in every detail, including the spring-loaded oleo struts. From what I hear, it's a really superb model.

This beautiful model's most striking feature is its wing. Each rib has been made up in a jig and then joined to the spars, in much the same way as the full-scale airplane was made. I was very much impressed by it! Since then, I've used this method, too, and the photo shows a couple of ribs I've made in a jig.



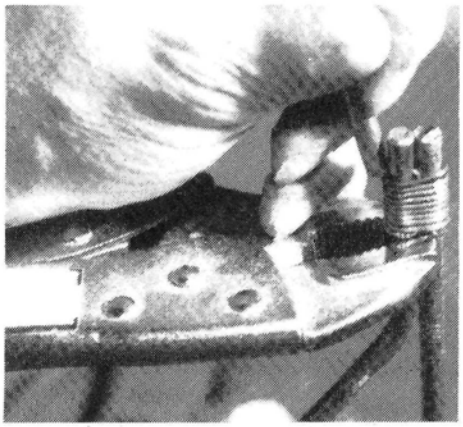
Jig-built wing ribs. (More details in text.)

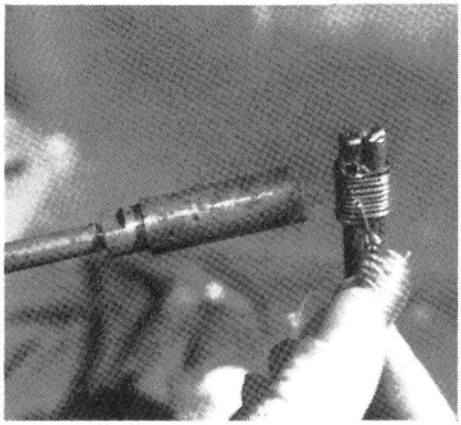
Obviously, this method is practical *only* with a constant-chord wing, as making the numerous jigs necessary for a tapered wing would be very laborious indeed. The ribs shown in the photo are made of 1/8-inch square Sitka spruce sticks. (If you cut this material yourself, be careful, as cutting such small strips on a table or a radial-arm saw often results in kick-back and splintering of the wood. Cut *carefully!*) I cheated with the solid-sheet piece at the leading edge: It's made of 1/8-inch lite-ply, so I *didn't* have to make the tight bends necessary to form the shape with the 1/8-inch square stock. Making such tight bends would require soaking the wood, and this is quite possible, but it can be avoided by using the method I've shown here.

The jig is made up on a solid piece of plywood (3/4 inch works well). All the open areas shown in the photo are filled with lite-ply, leaving a narrow slot that readily accepts the square stock. The square stock is cut to size, slipped into the open slots, and glued with CA (I use Hot Stuff*). Next, use CA to glue the 1/32-inch plywood gusset plates into place. These gussets add considerable strength and produce a rib that's lighter than one made of solid plywood or balsa. When the completed rib has been pried out of the jig, the same gussets are added to the other side of the rib. A light sanding then removes any excess material at the gusset locations. I wax the jig well before starting to make the ribs, because this prevents the glue from adhering to it, and the finished rib pops out easily. Use the wax used to seal preserves, rubbing it generously into the jig and then gently heating the jig with a torch to melt the wax into the wood. When the wood is well impregnated with wax, the glue won't stick to the jig.

The two vertical openings in the rib accept the box spars I prefer, and the slots fit the spar quite snugly. The ribs are slid onto the spar and are carefully positioned and then glued into place.

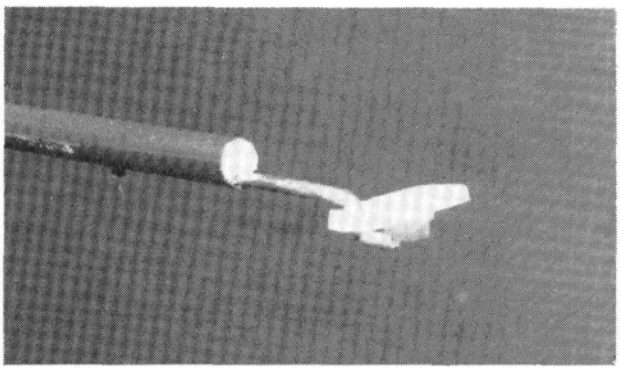
A leading edge of the usual shape is then glued into place, and the wing is ready for the addition of aileron and flap mechanisms (and so on) to complete it for covering. The result is a very light, ex-

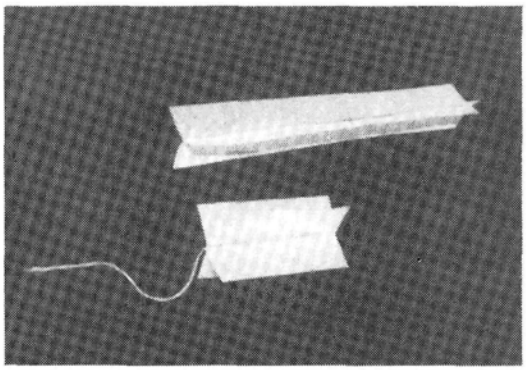




Left: Wrapping landing-gear legs for soldering. Text provides some new ideas for stronger gear struts.

Right: Soldering heavy wire requires propane torch and "harder" grade of solder. Care must be exercised to avoid removing temper from wire.





Left: Carbon arrow-shaft pushrod end. Wire is trapped in place by dowel plug driven into end of hollow shaft.

Right: Super Coverite hinges are formed with strips of material sewn together on sewing machine. Strong, flexible, easy, inexpensive hinge also closes gap between surfaces.

tremely strong wing. Admittedly, all this work will be hidden when the wing is covered, but having a photo of the uncovered wing to compare with a similar photo of the original, full-scale wing won't do your static score any harm!

A word here on the gussets used: They're quite small, and I make them with scrap material saved from cuttings of 1/32- and 1/64-inch plywood. Cutting them is a breeze, as the material cuts easily with the usual modeling knife, a pair of good scissors, or an office paper shears, which cut accurately. You choose the gusset shape; any shape that fits the construction material will do.

In areas requiring greater strength, the ribs may be fully covered on both sides with light (1/32- or 1/64-inch) plywood. This will not only increase strength, but will also provide a surface on which to mount such items as aileron servo plates, landing-gear mounting plates, etc.

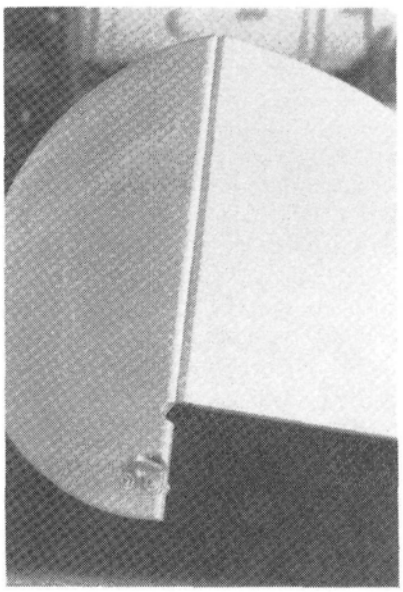
If you like to build meticulously, and particularly if you like building wings, you'll be keen on this method of producing your own "scale" wing ribs. Although this method takes more time than just bashing out a set of ribs using the typical "stack" method, I find it a fascinating procedure, and the resulting wing ribs are gratifying. The ribs can be made quickly if the material required is prepared beforehand. Using a set of small temporary jigs, I cut out the pieces in advance, and construction of the ribs goes quite rapidly. Using CA, the ribs may be popped out of the jig almost immediately, and many can be made in an evening.

Spars for these wings can be made in a variety of ways. I use a box spar like the one shown in the sketch. The interior bracing probably isn't necessary for the relatively short spans with which we're normally concerned, but I have a tendency to over-build a tad, so I add them. The wings produced by this method are particularly strong and somewhat lighter than those built with the usual method. Admittedly, the effort put into building such a wing is impossible to appreciate when the covering material has been added. There is, however, some personal satisfaction in knowing that the wing is much more "scale-like" than when using conventional construction methods.

As previously mentioned, having a pair of photos to compare the original wing and your model will be good for your static score if they're included in your documentation (assuming the model wing is a close replica the original, of course!).

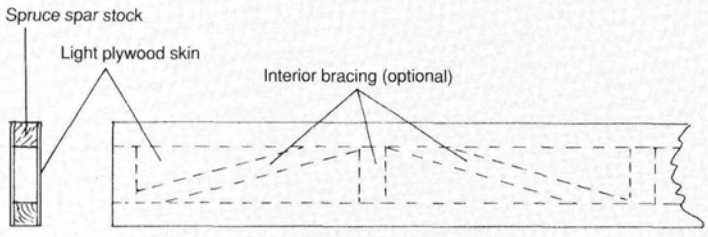
To me, making wire landing gear by wrapping the wire struts with copper wire and soldering the wire into place has always seemed a rather weak method of fastening wires together. This is particularly true of our larger, heavier models. I bet many of you have had wire gear part company during a hard landing, just as I have.

To remedy this weakness, I've switched a couple of the ingredients: I now use a much heavier steel wire to wrap the wire parts. (On the farm, it would be called "baling wire".) It's rather soft, is easily worked into the shapes we want, and it's much stronger than copper wire. In addition, I use a much harder solder than the solder used for electronic assembly work. The hard solder requires a somewhat higher temperature to melt it, but not high enough to draw the temper of the wire gear, as would be the case with brazing the wire.



Rudder hinged with Super Coverite. Even under close inspection, edge of hinge won't show if primed and painted properly. Note absence of hinge gap.

The photos show the size of wire I use to wrap the gear assembly. Holding the wire with vise-grip pliers while wrapping it and tapping it into place helps keep everything in its proper position while assembly is being completed. It isn't really necessary to use a flat punch to tap the wire coils tightly together, but it does make things look much neater. If you look carefully, you'll notice I start the end of

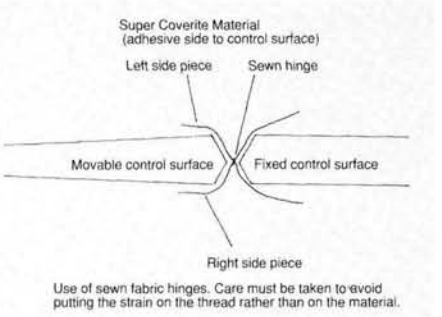


Sketch shows type of box spar used with jig-built wing ribs.

the wire parallel to, and between, the two landing-gear wires. I try to do the same thing with the other end of the wire, tucking it between the wires and behind the wrap. This hides the ends and makes a much neater job.

The soldering will require more temperature than you're probably used to, so be careful not to get the gear wire so hot that it draws its temper. It's important to get a good solid "take" on the solder and to apply enough solder to fully coat the wire. When this has been done, the wire assembly will be solid and will withstand considerable abuse. I've been using this method for some time now, and the few times I've had a gear badly damaged, I've had to repair a *lot* more than landing gear!

I like to use carbon-fiber arrow shafts for pushrods, because they're solid and



Use of sewn fabric hinges. Care must be taken to avoid putting the strain on the thread rather than on the material.

dependable. I've never seen one break, and they're easily adapted to our use. (The photo shows the result.)

With a piece of heavy piano wire, I make a short, right-angle bend at one end and a Z-bend at the other. The right-angle bend goes inside the arrow shaft with the angle projecting through a small hole in the side of the shaft. (This can be seen as a slight dark projection, below the shaft.) A piece of appropriately sized dowel is grooved for the wire and lightly hammered into the end of the shaft. If this is pushed part way into the shaft and some CA is added, the dowel can be tapped the rest of the way into place, and then sealed solidly.

The servo arm is then added to the Z-bend in the usual way. Threaded adjustable ends for these pushrods can be made up in a similar way. I make mine with bicycle or motorcycle spokes that are already threaded with an appropriate thread, providing the adjustment required for the "operating" end of the pushrod. The ends of the spokes are bent and inserted in exactly the same way.

This method for making pushrods works well and is really quite easy. It makes dependable pushrods, and, because they're made of carbon fiber, they're stronger than anything I've used previously. The blank arrow shafts aren't expensive and are available from most archery suppliers. They're also very light and resist bending and twisting quite well. Where there's a particularly long run, however, the pushrod should be supported along the run to prevent it from bending out of shape.

Another pet project of mine is making my own hinges. The photo shows a couple of short sections of hinge made from Super Coverite*. I sew these together as detailed in the sketch. (Actually, Mrs. Phillips sews them for me, as she doesn't allow me to use her sewing machine!) Be careful how you use these, because the thread alone shouldn't have to support the control surface. The beauty of these hinges is that they're quite strong, providing support along the length of the control surface. In addition, they provide a complete seal between the surfaces, so the control surface is much more effective than if a gap existed. They're also very flexible, and control surfaces using these hinges will move freely with little effort. If you've ever had a problem lining up the usual plastic or nylon hinges and have misaligned them, you'll know how inflexible they can be.

When the surfaces have been properly primed, sanded and painted, the edge of the hinge material becomes almost invisible. Depending on the paint used, there should be little or no interference with control-surface movement. When I'm using a finish for which a plasticizer or flex agent is available, I always use it, because when added to paints, it prevents them from becoming hard and brittle and thus maintains some flexibility. It's also a good idea to use it when painting fabric-covered surfaces, as paint containing a flex agent is much less likely to crack or craze owing to flexing.

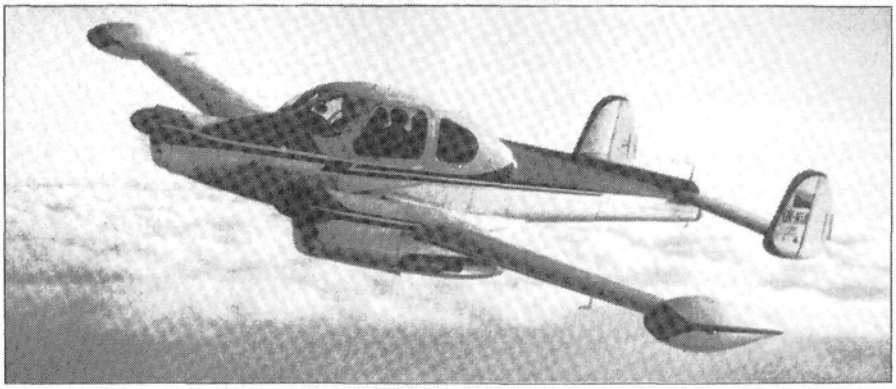
Well, that's it for this month. I've recently received some very interesting plans, and I'll provide some details in next month's column. One plan is a real beauty and only slightly short of a real work of art. Stay tuned for more details!

**Here are the addresses of the companies mentioned in this article:*
***Hot Stuff,** Satellite City, P.O. Box 836, Simi, CA 93062.*
***Coverite,** 420 Babylon Rd., Horsham, PA 19044.* ■

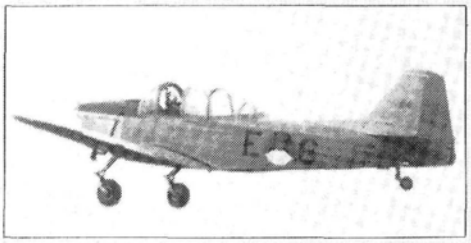
NAME THE PLANE CONTEST

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



CONGRATULATIONS TO Charles P. Stover of nearby Ridgefield, CT, for correctly identifying the Fokker S.11 Instructor trainer shown in our July issue. Charles' name was drawn from the 24 correct answers received. An additional 12 of you identified the bird as a 3000 Series N.O.R.D.



The S.11 first flew in December '47 and was developed to meet the requirements of the Dutch Air Force for a simple, two-place, primary trainer. It was powered by a Lycoming 0-435-A engine developing 190hp. The first production lot of 40 was built by Fokker for "home" use, and 41 units were supplied to the Israeli Air Force. Macchi of Italy produced the S.11 for the Italian Air Force under the designation of M.416. (A total of 150 were delivered with this designation.)

In 1954, Fokker established an associate company in Brazil, this being ultimately taken over by the Brazilian government. In addition to 100 S.11s, 70 S.12s (equipped with tricycle-gear) were produced. The S.11 had a wingspan of 36 feet, 1 inch, a length of 26 feet, 8 inches, a maximum speed of 130mph and a range of 400 nautical miles. ■

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model Airplane News.** If already a subscriber, the winner will receive a free one-year extension of his subscription.

ABOUT THOSE ENGINES

(Continued from page 132)

only a couple of important items.

First, Technopower motors come in two size ranges: one 5-cylinder and two 7-cylinders in 1/6 scale (2 inches = 1 foot), and a 3-, 5-, 7- and 9-cylinder in 1/5 scale (2.4 inches = 1 foot). Second, the motors spin props from 14 to 24 inches in diameter (larger props for the bigger motors, of course). But no matter what size prop you're using, rpm is limited to 9000 maximum, primarily by the "breathing" ability of the valves, and this limits the power output. For this reason, Technopower recommends that their engines be used in aircraft with light wing loadings—N3N Yellow Perils and Gloster Gladiators, rather than Corsairs and Hellcats. In any case, the Technopower motors are so beautiful—by far the most scale-appearing of all commercially built model engines!—it would be a real shame to conceal the workmanship inside close-fitting cowls.

**Here are the addresses of the companies mentioned in this article:*

Williams Brothers, *181 Pawnee Street, Lake San Marcos, CA 92069.*
Hannan's Runway, *P.O. Box A, Escondido, CA 92025.*
G-Mark Engines; *distributed by Cannon R/C Systems, 2828 Cochran Street, Suite 281, Simi Valley, CA 93065.*
Top Flite Models, *2635 S. Wabash Ave., Chicago, IL 60616.*
O.S. Engines; *distributed by Tower Hobbies, P.O. Box 778, Champaign, IL 61820.*
Technopower II Inc., *610 North Street, Chagrin Falls, OH 44022.* ■

GOLDEN AGE

(Continued from page 122)

thing never seen before and seldom seen since. As hoped for, flight was slow—much slower than average—but the real difference from others like it was its *maneuverability*. Not only did the Rookie loop and roll on command, but it did so precisely and with authority! Your commands just told it what movements you wanted, and the Rookie performed them for you. (Hoped for, but unexpected!)

Of course, Bill was very satisfied with his achievement, and the Rookie led him easily into multi flying. Naturally, the plane was written up as a feature article in

(Continued on page 140)

CLUB OF THE MONTH

The Ajax Radio Controlled Model Club

The Ajax Radio Controlled Model Club of Ajax, Ontario, Canada, is the Model Airplane News "Club of the Month" for September, '89.

Put out by Frank Rehak and Bruce Evans, their newsletter, "Tarmac," covers a wide range of topics, including coming events, helpful hints, safety measures, treasurer's report and even a lost-and-found section. Ten new members have recently joined the club, bringing membership to 77. The enthusiastic members of this well-organized club are proud of their excellent safety record.

It's obvious that this club realizes the importance of adhering to rules and maintaining safety procedures. One report in "Tarmac" includes a list of flying instructors, who are the only ones allowed to teach or supervise beginners. Another article stresses the importance of conducting routine maintenance checkups at the end of a day's flying.

Safety Director, Randy Scott, has some good advice: "Treat the pit area like a war zone. A moment of inattention or carelessness can cause grievous injuries." He reminds members to keep spectators out of the pit area. Mr. Scott also includes some drawings that make it quite clear why a modification was needed for the landing gear on the Goldberg Chipmunk. The diagrams show the original kit version and his suggestions for changes that would beef-up the landing-gear trunnion block and prevent it from splitting on landing.

Club President Ron Carr reported that he and about 20 other members visited the Air Canada Flight Simulator Center a few months ago. They each flew the simulator and, according to Mr. Carr, "I found out that it is a little different than my favorite pattern plane." They were also given a tour of the Air Canada hangars. It must have been quite interesting for these modelers to experience simulated flight inside a full-size cockpit.

In recognition of its members' sportsmanship and attention to community relations, Model Airplane News is pleased to award the Ajax Radio Controlled Model Club two, free, one-year subscriptions to be presented by them to two outstanding members. ■

Classified

WANTED: Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; (918) 245-3649.

SCALE DOCUMENTATION: Plan Enlarging. Photo packs, 3-view drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport. 80-page catalog $4. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (919) 292-5239.

PLANS ENLARGED, Large Scale Specialists. PC Model Software. Free catalog. Concept, P.O. Box 669E, Poway, CA 92064; (619) 486-2464.

WANTED: Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

GIANT SCALE PLANS by Hostetler. We fly what we draw. Send SASE to Wendell Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.

STRIPPED GLOW PLUG THREADS REPAIRED with stainless steel Heli-coils. 2-stroke heads $7.50. 4-stroke $10, postpaid. Send head only. Lee Custom Engines, 10112 Woodward Ave., Sunland, CA 91040.

MAKE A BEERCAN BIPLANE, 9 inches with 14-inch wingspan, $9.95. Kit Three, Box 72104, Marietta, GA 30007.

ENGINES: IGNITION, GLOW, Collectors, runners, used, new. Sell, trade, buy. Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537.

ALL ALUMINUM P-51D Mustang and P-51B Mustang III Precision 1/4 replica scale R/C kits. Extraordinary museum detail and a thrill to fly! All aluminum chemically milled and cut-out/drilled/formed—ready for assembly. Fifty-eight sold to date. Complete kit $5000. (Less engine & radio.) Sample rib section and details $25 or SASE for info. Warbirds Aviation, 122 Naubuc Ave., (NAP Bldg.), Glastonbury, CT 06033. (203) 657-3595.

OLD TIMERS, take a ride back in time to airplane modeling roots with this vintage book—*Gas Models*. A true collector's book from the early editors of *Model Airplane News*. It contains the best of modeling from the '30s and '40s, including great technical information and classic construction articles from the Golden Age period. $7.95, add $1.75 S&H; Foreign Surface Mail, add $2.75; Foreign Airmail, $5.50; Payment must be made in U.S. funds drawn on a U.S. bank or by an International Money Order. Air Age Mail-Order Service, 251 Danbury Rd., Wilton, CT 06897.

IMPORTED DIESEL ENGINES—WORLD'S BEST SELECTION: Current production Aurora, Cipolla, D-C, Enya, KMD, Mikro, MK-17, MVVS, PAW, Silver Swallow & USE Diesels. Also Mills and Taplin Twin replica diesels and very special imported glow engines. Catalog $1. CARLSON ENGINE IMPORTS, 814 E. Marconi, Phoenix, AZ 85022.

DISCOURAGED BY TOO-FAST R/C TRAINERS? Ease-of-flying ratings of over 30 popular trainers, $2. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

NOW, OAK FLIGHT BOXES! Last a lifetime. New designs for easy handling. Extra convenience. Kits or finished. Free radio flyer decal, catalog. Write: S & D Model Products, P.O. Box 4026R, Des Plaines, IL 60016.

ANTIQUE IGNITION AND GLOW PARTS CATALOG: 100 pgs., timers, needle valves, original cylinder heads, point sets, drive washers, stacks, spark plugs, plans. Engines: Atwoods, Baby Cyclones, McCoys, Hornets, others. $8 postpaid U.S., Foreign $20. Chris Rossbach, R.D. 1 Queensboro Manor, Box 390, Gloversville, NY 12078.

EMBROIDERED EMBLEMS, Enameled Pins, Your Design, Excellent Quality, Free Booklet, A.T. Patch Co., Dept 68, P.O. Box 682, Littleton, NH 03561, (603) 444-3423.

WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657.

RAZOR BLADES, single edge, carbon steel, first quality industrial. $5 per hundred plus 10% shipping. COBBIE'S GIFTS, RR 2, Box 454-A, Staunton, VA 24401, (703) 885-8036.

PRIVATE COLLECTION: Hundreds of aviation magazines for sale: *Popular Aviation, Flying, Model Airplane News, Air Trails, RAF Flying Review, Wings* and many others. 1932-1960. All in excellent condition. Send $2 for list. William C. Fort, Jr., 4161 Robin Hood Rd., Jacksonville, FL 32210.

CUSTOM EMBROIDERED PATCHES. Your design made any size, shape, colors. Five patch minimum. Free random sample and brochure. Hein Specialities, 7960 S.W. Manitou Trail, Glen Arbor, MI 49636.

HARDWARE, Socket-Head Cap Screws @ excellent prices. Example: alloy socket-head cap screws 4-40x1/2, $3.85/100; or Stainless $5.75/100. For free catalog, write to MICRO FASTENERS, P.O. Box 42, Netcong, NJ 07857, or phone (201) 347-2349.

FOR SALE: 1910-1960 model magazines, pulps, juvenile aviation books, historical aviation albums. $1 list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3

R/C WORLD—ORLANDO, FL, CONDO RENTALS—2 bedroom-furnished. Available weekly or monthly. Low rates. 100 acre flying field with enclosed hangar. Swimming pool, tennis courts on site. Minutes from Disney World and Epcot Center. For information call Kyra, (800) 243-6685 or write to Air Age Inc., Condo Dept., 251 Danbury Rd., Wilton, CT 06897.

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GOLDEN AGE

(Continued from page 138)

MAN, and many told him of similar success with it.

For those days, the Rookie was a big airplane. The 6-foot span and 12-inch chord gave nearly 900 square inches of area, but with a weight of only 6 pounds, it was easily hauled by the K&B .45 (another example of Bill's "flying on the wing" principle).

And that's not all: When you've traveled the road from the beginning, as Bill has, you have modeling experience and insight that can be applied to modern problems. Recently, when the new FAI "box" pattern rules were announced, people began to search for "just the right" airplane. Even though Bill is far removed from being a contest flier, with his background, he often sees solutions to problems.

Recalling the original Rookie's performance, Bill realized that it could be one possibility for FAI pattern—at least, it could again be a much-needed trainer. With the help of friends, he put together a new Rookie to see if his ideas were practical. The modern Rookie has the same airframe, but it's now powered by an Enya .60 4-stroke, which was chosen because of its torque and the anticipated need for a large-diameter prop to pull the plane through vertical maneuvers. A 14x6 proved best! The only other change was to its weight: The big, heavy 4-stroke plus a modern epoxy finish boosted the Rookie's weight to 8 pounds. Fortunately, as the flight report indicates, the weight wasn't a handicap.

For the test flights, Bill enlisted his favorite test pilot (probably Don Srull), and the Rookie immediately demonstrated its ability by easily accomplishing the FAI maneuvers. The Rookie not only flew the FAI schedule within the "box" but easily did it close to the pilot—within 100 feet; not out in the boondocks! Bill attributes its success to its basic, low flying speed, low wing loading, high power-to-weight ratio and high-torque engine that turns a large-diameter prop. Elementary, Dr. Watson?

Apparently, the Rookie continues to provide enjoyment for several fliers in Winter's clan. Bill has shown that OT R/C planes can be adapted to our needs as viable competition for modern planes, but they retain the mystique of the early birds. The new Rookie was presented as a construction article in *Model Builder* magazine, and they offer plans.

Since, over the past couple of months, I've devoted my column almost exclu-

sively to the extensive OT R/C Purdue project, it might seem that this is hardly *your* OT R/C place any more, but please feel that it *still is* and that I still want your input. You can contribute by sending details of your experiences. I'm sure there's *a lot* going on out there, and a postage stamp is relatively cheap! Out of time for old time … till *next* time! ■

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